InterPore2023

15th INTERNATIONAL CONFERENCE
ON POROUS MEDIA

CONFERENCE PROGRAM

22 - 25 May 2023

Edinburgh International
Conference Center
Edinburgh, Scotland

HERIOT WATT UNIVERSITY

Platinum Sponsor:

Kimberly-Clark

www.interpore.org/2023 | conference2023@interpore.org

InterPore

ORGANIZING COMMITTEE

Andreas Busch (LOC Co-Chair), Heriot-Watt University
Florian Doster (LOC Co-Chair), Heriot-Watt University
Kamaljit Singh (LOC Co-Chair), Heriot-Watt University
Julien Maes, Heriot-Watt University
Hannah Menke, Heriot-Watt University
Nick Harpers (Student Member), Heriot-Watt University
Zaid Jangda (Student Member), Heriot-Watt University
Nengi Karibi-Botoye (Student Member), Heriot-Watt University
Ekaterina Lgotina (Student Member), Durham University
Ming Wen (Student Member), Heriot-Watt University

PROGRAM COMMITTEE

Patrick Jenny (Chair), *ETH Zürich*, Switzerland
Sridhar Ranganathan (Vice Chair), *Kimberly-Clark Corporation*, United States
Goodarz Ahmadi, *Clarkson University*, USA
Matthias Appel, *Shell Global BV*, The Netherlands
Inga Berre, *Bergen University*, Norway
Anozie Ebigbo, *ETH Zürich*, Switzerland
Roseanne Ford, *University of Virginia*, USA
Sebastian Geiger, *Heriot-Watt University*, UK
Gennady Gor, *New Jersey Institute of Technology*, USA
Bo Guo, *University of Arizona*, USA
Tiina Roose, *University of Southampton*, UK
Hamdi Tchelepi, *Stanford University*, USA
Stéphane Zaleski, *University Pierre and Marie Curie*, France

EVENTS COMMITTEE

Oleg Iliev (Chair), *Fraunhofer Institute for Industrial Mathematics, ITWM,* Germany

WELCOME MESSAGES

FÀILTE GU DÙN ÈIDEANN! - WELCOME TO EDINBURGH!

We are delighted to host InterPore2023 in Edinburgh, the very first InterPore conference to be held in the UK. The UK is a country with a long tradition in porous media research that is also at the heart of Heriot-Watt's past, present and future. A very important theme in porous media is understanding and using the subsurface including the interaction of fluid mechanics and rock mechanics. Heriot-Watt has been and continues to be at the forefront of petroleum-related research. We are now increasingly focusing on research themes in the energy transition, particularly carbon storage, hydrogen and geothermal energy. As such, we welcome friends and colleagues from all over the world to Edinburgh and are proud that the Energy Transition is a special focus at Interpore 2023 with several dedicated events.

We sincerely hope that you will enjoy not only the scientific program, but also the conference location. The venue is situated right in the city centre with easy access to social activities, our vivid cultural hub focused on live events, and spectacular nature in and around Edinburgh. The Local Organizing Committee has worked with InterPore to offer you an event that you will hopefully remember as successful and joyful for years to come and we look forward meeting as many of you as possible.

Welcome to Edinburgh!
The InterPore2023 Local Organizing Committee

WELCOME MESSAGES

Michel Quintard
CNRS, Institut de Mécanique des Fluides de Toulouse

Dear Colleagues,

On behalf of the Executive Committee, I welcome you to the 15th International Conference on Porous Media and Annual Meeting of the International Society for Porous Media (InterPore). We are pleased that you can join us in this beautiful city of Edinburgh for this multidisciplinary international meeting that brings together colleagues from the global porous media community. The conference presentations include new and exciting advances in porous media studies that cut across disciplines and span from fundamental science to applications, using new experimental methods, machine learning and advanced computational simulation and analysis.

For two years, we had to organize InterPore Conferences as pure online events. InterPore staff, committees and members did a very successful job in organizing such virtual events. At last, even if the COVID-19 pandemic was not completely under control, it was possible to organize the 2022 InterPore Annual Conference as a hybrid conference at Khalifa University (UAE). It was a very successful event! We shall pay tribute for that to the memory of our host, Dr. Mohamed Sassi, who, unfortunately, passed away this year.

InterPore2022 was indeed a great success. We gained a lot of experience in the organization of such hybrid events. Feedback from organizers and participants was used to update and improve the format of this year's conference. We hope that online and in-person participants will enjoy this new experience.

Indeed, the conference could not have happened without the effort and dedication of many people. We are deeply thankful to the hard work of the local organizers, under the leadership of Andreas Busch, Florian Doster, and Kamaljit Singh, and also to the great job of the Program Committee, the Organizing Committee, Communication Committee, and InterPore's executive staff.

Thank you for participating in InterPore2023. Please enjoy the conference, meet and make friends, learn and share as much as you can. All kind of opportunities are available to participants to make InterPore2023 a thriving and fruitful event.

On behalf of the executive committee,

Michel Quintard
President of InterPore

InterPore National Chapters

National chapters offer elevated visibility, improved local and global networking, platforms for joint workshops and many other benefits.

Existing Chapters


Australia


Benelux


Brazil


China


Columbia


France


Germany


Hellenic


India


Iran


Israel


Italy


Mexico


Norway


Saudi Arabia


Spain


United Kingdom


Southern US


West Africa

Chapters Under Formation include:
Midwest-Northeast US, Maghreb, Japan, Hong Kong, Denmark & Austria

InterPore National Chapter Committee Members:

Maja Rucker, Technical University of Eindhoven, *The Netherlands*
Eduardo Abreu, University of Campinas, *Brazil*
Michel Quintard, CNRS, IMFT, *France*
Nicolae Tomozeiu, Canon Production Printing, *The Netherlands*
Xiaofan Yang, Beijing Normal University, *China*
Didier Lasseux (Chair), CNRS, I2M, *France*

Visit the InterPore online booth to learn more about joining or starting your local chapter!

InterPore
Student Affairs

The Student Affairs Committee, in collaboration with student LOC members, is thrilled to announce several activities during InterPore2023:
Our Career Development Event will feature four esteemed speakers from academia and industry who will provide valuable guidance and perspectives on career options in this rapidly evolving era of energy transition and green shift. Additionally, two workshops by leading experts will cover the essential skills of impactful research paper writing and designing engaging scientific posters. Finally, join us for Game Night, an opportunity to network and connect with fellow researchers in a relaxed and fun environment.

All events are free of charge and open to InterPore2023 participants from all career stages, including undergraduates, PhDs, Postdocs, and early career researchers. Come expand your professional network, learn about the InterPore Young Academy and Porous Media Tea Time Talks initiative, and get inspired to become involved in student-focused activities at the national and global levels.

For more information on the Career Development Event, Workshops, and Game Night, please refer to the detailed program.

InterPore SAC 2023 Board Members

Chair
Mohammad Nooraiepour
University of Oslo, *Norway*

Nara Brandao Costa
TotalEnergies, *Brazil*

Chiara Recalcati
Politecnico di Milano, *Italy*

Ramin Moghadasi
University of Gothenburg, *Sweden*

Carlos Felipe Silva Escalante
National Autonomous University of Mexico (UNAM), *Mexico*

Mohammad Masoudi
University of Oslo, *Norway*

Would you like to join SAC and make InterPore2023 even better?
Contact **sac@interpore.org**

InterPore Foundation

In support of the outreach activities, one goal of the Foundation is to facilitate the participation of promising **young scientists** in **international scientific gatherings** and support outstanding young scientists from **countries with financial difficulties** in joining InterPore activities.

Since 2018, the InterPore Foundation has provided over **85 conference grants** to students and young scientists. The Foundation aims to increase both the number and amount of these grants for the coming years.

Visit the InterPore virtual booth to learn more about the Foundation and how your contributions count!

Make all this possible - DONATE NOW!

InterPore Academy

InterPore Young Academy Porous Media Tea Time Talks

Promoting InterPore educational and training activities via:

- **Short courses**
- **Webinars**
- **Thematic workshops**
- **Young Academy activities**

Visit the InterPore virtual booth to learn more about upcoming events & suggest topics and lecturers!

InterPore Academy Governance:

Director: Brian Berkowitz, Weizmann Institute of Science, *Israel*
Scientific Secretary: M. Sadegh Riasi, University of Cincinnati, *USA*
Chair of Webinar Committee: Sebastian Geiger, Delft University of Technology, *Netherlands*
Chair of Short Course Committee: Ilenia Battiato, Stanford University, *USA*
Co-Chairs of the Young Academy: Marcel Moura, University of Oslo, *Norway*
Catherine Spurin, Imperial College London, *UK*
Mohammad Nooraiepour, University of Oslo, *Norway*

Young Academy Team

www.interpore.org/academy/

THANKS TO OUR SPONSORS

PLATINUM

Kimberly-Clark

SILVER

MATH 2 MARKET

ThermoFisher SCIENTIFIC

TESCAN

Canon CANON PRODUCTION PRINTING

BRONZE

COMSOL

InterPore2023 is also supported by:

VISIT OUR EXHIBITORS

MATH
2 MARKET

Booth #1

Math2Market develops and distributes the GeoDict software, used worldwide for computer-aided microstructural material analysis, design, and optimization. With GeoDict, material properties are digitally determined on the micro-, meso-, and macro-scale and these results are used for material design and optimization.

With GeoDict, we offer customer- and application-specific software adaptations, project work, personalized reliable scientific support, expert training, workshops, and annual user meeting through our dedicated, technical, and highly competent team. We advise and support in all material research and development needs for our customers to bring forward material innovations in a fraction of the time and cost.

www.math2market.com

TESCAN

Booth #7

TESCAN enables nanoscale investigation and analysis within the geosciences, materials science, life sciences and semiconductor industries. The company has a 30 -year history of developing innovative electron microscopy, micro-computed tomography, and related software solutions for customers in research and industry worldwide. For example, TESCAN's TENSOR is the first 4D-scanning transmission electron microscope (4D-STEM) built from the ground up for a totally new level of performance and user experience. As a result, TESCAN has earned a leading position in micro- and nanotechnology.

Come and visit our booth and chat with our experts about our latest solutions in micro-computed tomography.

www.tescan.com

VISIT OUR EXHIBITORS

ThermoFisher SCIENTIFIC

Booth #10

Thermo Fisher Scientific is the world leader in serving science. Our mission is to enable our customers to make the world healthier, cleaner and safer.

With Thermo Scientific™ PerGeos and Avizo™ Software, we provide a complete solution from data acquisition to visualization, analysis and simulation helping you to solve complex natural and industrial porous media systems challenges.

www.thermofisher.com/pergeos

HIDEN ISOCHEMA

Booth #6

Hiden Isochema is a world leader in the design and manufacture of high accuracy sorption instruments. We offer a range of fully automated gravimetric, manometric and breakthrough sorption analyzers which are used to determine the equilibria and kinetics of gas and vapor sorption by a wide range of materials. Our IGA and IGAsorp are well established gravimetric gas and vapor sorption analyzers whilst the XEMIS offers compatibility with corrosive species and operation at pressure up to 200 bar. Our IMI series high pressure manometric gas sorption analyzers also operate to 200 bar, and we offer automated breakthrough analyzers (ABR), membrane permeation analyzers (MBR), plus bespoke design and manufacturing services.

www.hidenisochema.com

VISIT OUR EXHIBITORS

micromeritics®

Booth #4

Micromeritics Instrument Corporation is a global manufacturer of material characterization systems with industry leading performance and application expertise in the following areas: density, surface area and porosity, powder rheology, particle interactions including catalyst characterization and process development. The company is headquartered in Norcross, Georgia, USA with manufacturing sites in the U.S. and Europe, and direct sales operations throughout North America, Europe, and Asia.

www.micromeritics.com

Surface Measurement Systems
World Leader in Sorption Science

Booth #9

At Surface Measurement Systems, we aim to expand the frontiers of particle, materials, and surface science. We develop unique characterization solutions for solid state materials, from manufacturing state-of-the-art instrumentation to offering tailored characterization solutions. Starting with a first of-its-kind instrument being supplied in 1992, SMS Holdings now operates all across the world, with 5 subsidiaries spread between its instrumentation and contract laboratories branches. Whether it's our unrivalled series of sorption analyzer instruments, or the in-depth contract analysis services on offer, SMS is a globally-renowned organization that remains synonymous with innovative engineering and scientific excellence, unmatched in the field of sorption science.

www.surfacemeasurementsystems.com

TELEDYNE ISCO
Everywhereyoulook™

Booth #2

Visit with our experts at the exhibit to learn how pumps technology and chromatography from Teledyne ISCO can help you. We have SyriXus® high-precision syringe, ReaXus® reciprocating, and PeriXus® peristaltic pumps. These rugged pumps solve your toughest fluid delivery problems, from micro-flow to scale-up and pilot plant to corrosive liquids. They're used in core flooding and reactant feed, to alternative energy, carbon sequestration, and pharma. We are quite broad in pumping gases and fluids: CO2, CH4, H2, N2, water, and brine. Control and measure flow rates and changes and use them at constant pressure or to determine pressure changes.

www.teledyneisco.com/pumps

DO YOU KNOW….EDINBURGH?

Edinburgh Festival Fringe

The Edinburgh Festival Fringe is the world's largest arts festival, which in 2018 spanned 25 days and featured more than 55,000 performances of 3,548 different shows in 317 venues. Like our annual conference, it was hit hard by travel restrictions with COVID and stayed mostly digital over the last two years, so it was great to have people flocking the city center again this past summer. We are looking forward to seeing porous media people exploring Edinburgh at InterPore 2023.

Geochemical modeling in porous media
Sunday, 9:00 - 12:00
Leonardo Royal Hotel Edinburgh Haymarket
Instructors:
Hang Deng, *Peking University*
Sergi Molins, *Lawrence Berkeley National Laboratory*

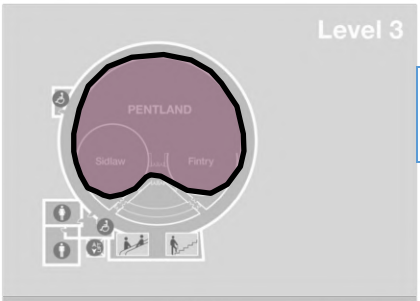
Modelling Porous Media with COMSOL Multiphysics
Sunday, 13:00 - 16:00
Leonardo Royal Hotel Edinburgh Haymarket
Instructor:
Nancy Bannach, *COMSOL Multiphysics GmbH*

Digital porous media: combining open data, flow simulation and machine learning
Friday, 9:00 - 12:00
Heriot-Watt University
Instructor:
Maša Prodanović, *The University of Texas at Austin*

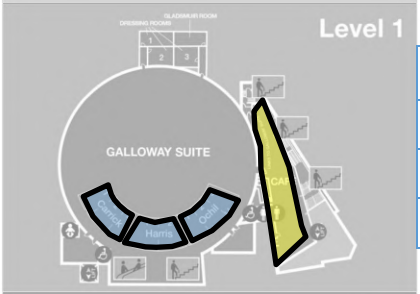
Advanced sorption characterisation of porous materials: dynamic gravimetric sorption and inverse gas chromatography
Friday, 13:00 - 16:00
Heriot-Watt University
Instructors:
Paul Iacomi, *Surface Measurement Systems*
Connor Hewson, *Surface Measurement Systems*

3D imaging of porous materials (e.g., rocks, batteries) using Avizo Software: new segmentation and deep/machine learning options
Friday, 13:00 - 16:00
Heriot-Watt University
Instructors:
Andreas Staude, *Thermo Fisher Scientific*

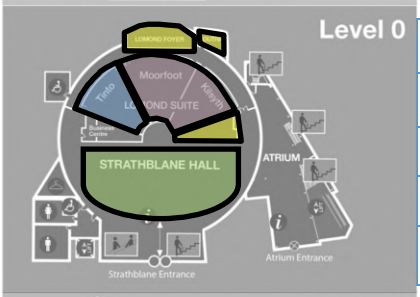
VENUE FLOORPLAN



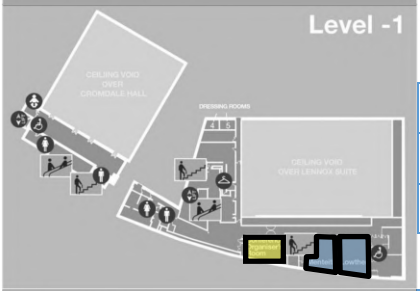
Pentland	Plenary Sessions Invited Session A



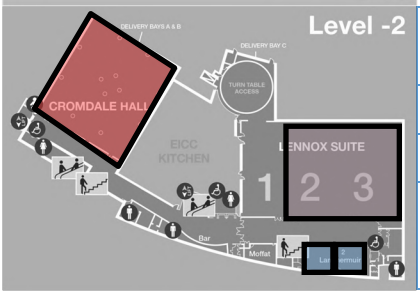
Carrick	Parallel Sessions
Harris	Parallel Sessions
Ochil	Parallel Sessions
Platform 5	VIP Area



Strathblane	
Moorfoot & Kilsyth	Invited Session B
Tinto	Parallel Session
Lomond Foyer	Speaker Ready Room
Soutra	Meeting Room



Monteith	Parallel Sessions
Lowther	Parallel Sessions
Soutra	Interview Room



Cromdale Hall	Posters & Exhibition Welcome Reception Coffee Breaks (except Monday
Lammermuir 1	Parallel Sessions
Lammermuir 2	Parallel Sessions
Lennox	DEI Lunch Forum Career Event Student Workshops Energy Transition Event

LIST OF MINISYMPOSIA

(MS01) Porous Media for a Green World: Energy & Climate

Organizers: Hamed Aslannejad, Lauren Beckingham, Maartje Boon , Brian Ellis, Anna Herring, Hans Janssen, Kai Li, William Rossen , Yuhang Wang

(MS02) Porous Media for a Green World: Water & Agriculture

Organizers: Milad Aminzadeh, Li Chen, Steven Jansen , Nima Shokri , Jan Vanderborght

(MS03) Flow, transport and mechanics in fractured porous media

Organizers: Jeffrey Hyman, Olav Moyner, Hamid Nick, Holger Steeb, Hongkyu Yoon

(MS04) Swelling and shrinking porous media

Organizers: Daniel Markl, Chris McMinn, Sridhar Ranganathan, Yida Zhang, Yihuai Zhang

(MS05) Biochemical processes and biofilms in porous media

Organizers: Roseanne Ford, Veronica Morales, Eleonora Secchi

(MS06-A) Physics of multi-phase flow in diverse porous media

Organizers: Ryan Armstrong, Saman Aryana, Yaniv Edery, Ying Gao, Yu Jing, Signe Kjelstrup, Mohamad Masoudi

(MS06-B) Interfacial phenomena in multiphase systems

Organizers: Ran Holtzman, Kamaljit Singh, Oshri Borgman, Subhadeep Roy, Nathaly Lopes Archilha, Eduardo Abreu

(MS07) Mathematical and numerical methods for multi-scale multi-physics, nonlinear coupled processes

Organizers: Jakub Both, Huangxin Chen, Nadja Ray, Shuyu Sun

(MS08) Mixing, dispersion and reaction processes across scales in heterogeneous and fractured media

Organizers: Branko Bijeljic, Marco Dentz, Mohammad Nooraiepour, Mozhdeh Sajjadi, Amir Raoof, Qingwang Yuan

(MS09) Pore-scale modelling

Organizers: Bo Guo, Yashar Mehmani, Moran Wang, Chiyu Xie, Ke Xu, Yongfei Yang**,** Stéphane Zaleski

(MS10) Advances in imaging porous media: techniques, software and case studies

Organizers: Martin Blunt, Marijn Boone, Matthijs de Winter, Eseosa Ekanem, Maja Rucker, Lin Ma, Liwei Zhang

(MS11) Microfluidics and nanofludics in porous systems

Organizers: Hossein Hejazi, Helge Hellevang, Hassan Mahani, Sophie Roman

(MS12) Advances in Computational and Experimental Poromechanics

Organizers: Jianchao Cai, Rich Chalaturnyk, Sebastian Geiger, Amir Haghi, Xiaozhe Hu, Florin A. Radu, Joshua White

(MS13) Fluids in Nanoporous Media

Organizers: Elizabeth Barsotti, Bin Pan, Ahmad Sakhaee-Pour

(MS14) Uncertainty Quantification in Porous Media

Organizers: Michele Botti, Ben Mansour Dia, Rodrigo Weber dos Santos, Mina Karimi

(MS15) Machine Learning and Big Data in Porous Media

Organizers: Bailian Chen, Teeratorn Kadeethum, Pania Newell, Jianchun Xu, Hongkyu Yoon

(MS16) Fluid Interactions with Thin Porous Media

Organizers: Richmond Cohen, Dwayne Jackson, Satoru Katoh, Chaozhong Qin

(MS17) Thermal Processes, Thermal Coupling and Thermal Properties of Porous Media: modeling and experiments at different scales

Organizers: Huijin Xu, Peng Zu, Ruina Xu, Yingfang Zhou

(MS18) Innovative Methods for Characterization, Monitoring, and In-Situ Remediation of Contaminated Soils and Aquifers

Organizers: Carlo Bianco, Jaime Gomez-Hernandez, Tannaz Pak

(MS19) Elastic, electrical, and electrochemical processes and properties in porous media

Organizers: Rukuan Chai, Pablo Garcia Salaberri, ChungHyuk Lee, Qingyang Lin, Yuqi Wu

(MS20) Biophysics of living porous media: theory, experiment, modeling and characterization

Organizers: Tobias Koeppl, Dominik Obrist, Fred Vermolen

(MS21) Non-linear effects in flow and transport through porous media

Organizer: Alberto Guadagnini, Hossein Hejazi, Yves Méheust, Mohaddeseh Mousavi Nezhad

(MS22) Manufactured Porous Materials for Industrial Applications

Organizer: Senyou An, Oleg Iliev, Vahid Niasar, Mohammadjavad Shokriafra

(MS23) Special session in honor of Signe Kjelstrup

Organizer: Bjørn Hafskjold, Øivind Wilhelmsen, Alex Hansen

SUNDAY, 21 MAY 2023

08:30 - 16:00	Short Courses: *Leonardo Royal Hotel Edinburgh Haymarket*
12:00 - 18:00	Pre-Check-in: *Leonardo Royal Hotel Edinburgh Haymarket*

MONDAY, 22 MAY 2023

8:00	Registration (Open every day): *Strathblane Hall*							
	Plenary Session 1: *Pentland Auditorium*							
09:00 – 09:05	Opening Ceremony							
09:05 – 09:10	Award Ceremony InterPore Meritorious Service Medal: *Steffen Berg*							
09:10 – 09:50	Plenary Lecture: Nathalie Tufenkji							
09:50 – 10:20	Plenary lecture on Diversity, Equality, and Inclusiveness (DEI): Adriana Paluszny - *Pentland Auditorium*							
10:20 – 10:50	Coffee Break: *Cromdale Hall*							
10:50 – 12:35	Session 1.1							
	Tinto	*Carrick*	*Lammermuir 1*	*Lammermuir 2*	*Monteith*	*Harris*	*Lowther*	*Ochil*
	MS01	MS22	MS03	MS13	MS06-A	MS17	MS09	MS14
12:35 – 13:45	DEI Lunch Forum: *Lennox Hall* (lunch provided)							
12:35 - 13:45	Lunch Break							
13:45 – 15:45	Session 1.2							
	Tinto	*Carrick*	*Lammermuir 1*	*Lammermuir 2*	*Monteith*	*Harris*	*Lowther*	*Ochil*
	MS02	MS18	MS03	MS08	MS06-B	MS21	MS09	MS15
15:45 – 16:15	Coffee Break: *Strathblane Hall*							
	Invited Lecture 1: *Pentland Auditorium*				Invited Lecture 2: *Moorfoot & Kilsyth*			
16:15 – 16:45	Invited Lecture: Shervin Bagheri				Invited Lecture: Raffaella Ocone			
16:45 – 16:50	Learn about Thermo Fisher				Teledyne ISCO - Pump With More Capabilities			
17:00 – 18:00	Session 1.3							
	Tinto	*Carrick*	*Lammermuir 1*	*Lammermuir 2*	*Monteith*	*Harris*	*Lowther*	*Ochil*
	MS01	MS05	MS03	MS08	MS06-A	MS17	MS09	MS15
18:00 – 19:30	Exhibition Opening & Welcome Reception: *Cromdale Hall*							

TUESDAY, 23 MAY 2023

	Plenary Session 2: *Pentland Auditorium*							
08:30 – 08:40	Award Ceremony Honorary Lifetime Membership Award: *Dorthe Wildenschild* Kimberly-Clark Distinguished Lectureship Award: *Ruben Juanes*							
08:40 – 09:20	Plenary Lecture: Eugene Vorobiev							
09:30 – 10:30	Session 2.1							
	Tinto	*Carrick*	*Lammermuir 1*	*Lammermuir 2*	*Monteith*	*Harris*	*Lowther*	*Ochil*
	MS01	MS05	MS03	MS08	MS06-B	MS21	MS09	MS15
10:30 – 12:00	Poster Session I & Exhibition: *Cromdale Hall* (refreshments provided)							
12:00 – 13:00	Session 2.2							
	Tinto	*Lennox Hall*	*Lammermuir 1*	*Lammermuir 2*	*Monteith*	*Harris*	*Lowther*	*Ochil*
	MS01	*Career Event*	MS03	MS08	MS06-A	MS19	MS09	MS15
13:00 – 14:15	Lunch Break							
14:15 – 15:30	Session 2.3							
	Tinto	*Carrick*	*Lammermuir 1*	*Lammermuir 2*	*Monteith*	*Harris*	*Lowther*	*Ochil*
	MS01	MS05	MS03	MS08	MS06-A	MS19	MS11	MS10
	Invited Lecture 3: *Pentland Auditorium*				Invited Lecture 4: *Moorfoot & Kilsyth*			
15:35 – 15:40	GeoDict - The Digital Material Laboratory				Breakthrough: CO_2 on zeolites studies			
15:40 – 16:10	Invited Lecture: Bruce Balcom				Invited Lecture: Gerard Vignoles			
16:10 – 17:40	Poster Session II & Exhibition: *Cromdale Hall* (coffee, beer & soft drinks provided)							
18:00 – 20:00	Student Team Building Activity/Game Night: *BrewDog Pub Lothian Road*							

WEDNESDAY, 24 MAY 2023

	Plenary Session 3: *Pentland Auditorium*							
08:30 – 08:40	Award Ceremony InterPore Medal for Porous Media Research: *Philippe Coussot* InterPore Award for Porous Media Research: *Pejman Tahmasebi*							
08:40 – 09:20	Plenary Lecture: Adrian Bejan							
09:30 – 10:30	Session 3.1							
	Tinto	*Carrick*	*Lammermuir 1*	*Lammermuir 2*	*Monteith*	*Harris*	*Lowther*	*Ochil*
	MS01	MS05	MS12	MS08	MS06-B	MS22	MS11	MS15
10:30 – 12:00	Poster Session III & Exhibition: *Cromdale Hall* (refreshments provided)							
12:00 – 13:00	Session 3.2							
	Tinto	*Carrick*	*Lammermuir 1*	*Lennox Hall*	*Monteith*	*Harris*	*Lowther*	*Ochil*
	MS01	MS20	MS04	*Student Workshop*	MS06-B	MS07	MS11	MS15
13:00 – 14:15	Lunch Break							
14:15 – 15:30	Session 3.3							
	Tinto	*Carrick*	*Lammermuir 1*	*Lennox Hall*	*Monteith*	*Harris*	*Lowther*	*Ochil*
	MS01	MS20	MS04	*Student Workshop*	MS06-A	MS07	MS11	MS10
	Invited Lecture 5: *Pentland Auditorium*				Invited Lecture 6: *Moorfoot & Kilsyth*			
15:35 – 15:40	InterPore Foundation				Hiden Isochema sorption analyzers			
15:40 – 16:10	Invited Lecture: Behnam Jafarpour				Invited Lecture: Lidietta Giorno			
16:10 – 17:40	Poster Session IV & Exhibition: *Cromdale Hall* (coffee, beer & soft drinks Provided)							
18:00 - 20:00	Walk to Arthur's Seat: *Meet in Strathblane Hall*							

THURSDAY, 25 MAY 2023

	Invited Lecture 7: *Pentland Auditorium*				Invited Lecture 8: *Moorfoot & Kilsyth*			
08:30 – 09:00	Invited Lecture: Rouhi Farajzadeh				Invited Lecture: Adriana Paluszny			
09:00 – 09:05	Learn about TESCAN				Learn about Surface Measurement Systems			
09:15 – 10:45	Session 4.1							
	Tinto	*Carrick*	*Lammermuir 1*	*Lammermuir 2*	*Monteith*	*Harris*	*Lowther*	*Ochil*
	MS01	MS23	MS12	MS13	MS06-A	MS07	MS09	MS10
10:45 – 12:15	Poster Session V & Exhibition: *Cromdale Hall* (refreshments provided)							
	Energy Tranistion Event: *Lennox Hall* (lunch provided)							
12:15 – 12:55	Plenary lecture on Energy Transition: Onno von Kessel							
12:55 – 13:55	Energy Transition Forum							
12:55 – 14:00	Lunch Break							
14:00 – 15:30	Session 4.2							
	Tinto	*Carrick*	*Lammermuir 1*	*Lammermuir 2*	*Monteith*	*Harris*	*Lowther*	*Ochil*
	MS01	MS23	MS16	MS13	MS06-B	MS07	MS09	MS10
15:30 – 17:00	Poster Session VI & Exhibition: *Cromdale Hall* (coffee, beer & soft drinks Provided)							
	Plenary Session 4: *Pentland Auditorium*							
17:00 – 17:40	Plenary Lecture: J. Carlos Santamarina							
17:40 – 18:00	Award Ceremony MDPI Energies Student Poster Awards InterPore – PoreLab Award for Young Researchers: *Pranay Shrestha* Rien van Genuchten Early-Career Award of Porous Media for a Green World: *Junjie Zhong* InterPore National Chapter Award InterPore Rosettes							
18:00 - 18:05	Closing Ceremony							

FRIDAY, 26 MAY 2023

08:30 - 16:00	Short Courses: *Heriot Watt University*

Through collaborative teams that push boundaries and endless opportunities to work with some of the world's most recognized brands, at Kimberly-Clark you and your purpose are in the driver's seat of your career.

Huggies®. Kleenex®. Andrex®. Scott®. Kotex®. Depend®.

For 150 years, our brands have been brought to market by a team of purpose-led innovators dedicated to creating Better Care for a Better World. And it takes the right people—in the right jobs and the right place—to make that happen. Join our 45,000+ employees who are changing the world for the better and generously giving back to communities and causes around the globe.

PROGRAM HIGHLIGHTS

Opening Ceremony

Monday, Pentland Auditorium *9:00 -9:05*

Award Ceremony: *InterPore Meritorious Service Medal*

Monday, Pentland Auditorium *9:05 -9:10*

Plenary Lecture: Nathalie Tufenkji

Monday, Pentland Auditorium *9:10- 9:50*

Diversity, Equality & Inclusiveness Plenary Lecture

Monday, Pentland Auditorium *9:50 -10:20*

Diversity, Equality & Inclusiveness Forum (lunch provided)

Monday, Lennox Suite *12:35 -13:45*

Invited Lectures: *Shervin Bagheri & Raffaella Ocone*

Monday, Pentland Auditorium & Moorfoot/Kilsyth *16:15 -16:45*

Exhibition Opening & Welcome Reception

Monday, Cromdale Hall *18:00 -19:30*

Award Ceremony: *InterPore Honorary Lifetime Membership Award & Kimberly-Clark Distinguished Lectureship Award*

Tuesday, Pentland Auditorium *8:30* - 8:40

Plenary Lecture: *Eugene Vorobiev*

Tuesday, Pentland Auditorium *8:40 - 9:20*

SAC Career Event

Tuesday, Lennox Suite *12:00 - 13:00*

Invited Lectures: *Bruce Balcom & Gerard Vignoles*

Tuesday, Pentland Auditorium & Moorfoot/Kilsyth *15:40-16:10*

Student Game Night

Tuesday, BrewDog Pub Loathian Road *18:00-20:00*

PROGRAM HIGHLIGHTS

Award Ceremony: *InterPore Medal for Porous Media Research & InterPore Award for Porous Media Research*

Wednesday, Pentland Auditorium *8:30 - 8:40*

Plenary Lecture: *Adrian Bejan*

Wednesday, Pentland Auditorium *8:40 - 9:20*

"What makes a good research paper?" Workshop

Wednesday, Lennox Suite *12:00 - 13:00*

"#BetterPoster" Workshop

Wednesday, Lennox Suite *14:15 - 15:30*

Invited Lectures: *Behnam Jafarpour & Lidietta Giorno*

Wednesday, Pentland Auditorium & Moorfoot/Kilsyth *15:40 - 16:10*

Walk to Arthur's Seat

Wednesday, Meet in Strathblane *18:00*

Invited Lectures: *Rouhi Farajzadeh & Adriana Paluszny*

Thursday, Pentland Auditorium & Moorfoot/Kilsyth *8:30 - 9:00*

Energy Transition Plenary Lecture & Forum (lunch provided)

Thursday, Lennox Suite *12:15 - 13:55*

Plenary Lecture: *J. Carlos Santamarina*

Thursday, Pentland Auditorium *17:00 - 17:40*

Award Ceremony*: MDPI Student Poster Awards, InterPore PoreLab Award for Young Researchers, Porous Media for a Green World Award, National Chapter Award & InterPore Rosettes*

Thursday, Pentland Auditorium *17:40 - 18:00*

Closing Ceremony

Thursday, Pentland Auditorium *18:00 - 18:05*

DO YOU KNOW....EDINBURGH?

Arthur's Seat

Edinburgh is often said to have been built on seven hills in an allusion to Rome, although it's not hard to come up with a few more if you know the city well. The highest of them all is known as Arthur's Seat, an ancient volcano that erupted 350 million years ago. Although it is sometimes said that its name derived from the legend of King Arthur, it is more likely coming from the Gaelic Àrd-na-Said, meaning height of arrows. It's a short, slightly strenuous hike to the highest point (251 m), but absolutely worth it to look out over Edinburgh from this vantage point.

MONDAY, 22 MAY 2023

Plenary Session

Pentland Auditorium *9:00 - 10:20*
Chair: *Michel Quintard*

Opening Ceremony *9:00 - 9:05*

Award Ceremony 1 *9:05 - 9:10*

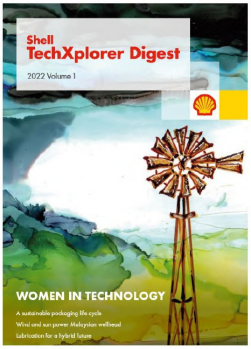
InterPore Meritorious Service Medal

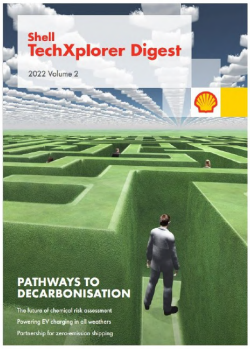
Steffen Berg
Shell Global Solutions International B.V, The Netherlands

The InterPore Meritorious Service Medal recognizes individuals for exceptional, prolonged, impactful, and meaningful services to the Society. These individuals have exhibited such exceptional devotion of time, effort, thought, and action as to set them apart from other contributions.

SHELL TECHXPLORER DIGEST

Shell's technology magazine that showcases the breadth and depth of scientific research and technology applications within the Company





Plenary Lecture *9:10 - 9:50*
Pentland Auditorium
Chair: *Christoph Arns (*University of New South Wales)

Nathalie Tufenkji
McGill University, *Canada*

Porous Graphene Oxide Macrostructures for Water Treatment Applications

Providing clean, safe water reliably in an affordable manner is a major global challenge. A wide variety of water pollutants, including heavy metals, dyes, pesticides, and pharmaceutical compounds pose a threat to public and environmental health. Existing water treatment technologies do not adequately meet water quality standards for removal of the diverse range of contaminants; thus, technological innovation is needed to enhance water security and accessibility. Engineered nanomaterials, such as graphene oxide (GO), offer tunable multifunctionality for effective removal of a diverse range of contaminants from water. However, the practical implementation of nanomaterials such as GO in water treatment requires their immobilization into three-dimensional macrostructures which may impair their performance. Unlike colloidal nanomaterials, solid macrostructures of GO can be easily stored, transported and manipulated. Despite the progress on forming high surface area and multifunctional GO macrostructures, synthesizing mechanically robust porous macrostructures, especially for wet applications, is a challenge. This talk will describe approaches for the preparation of GO-based macrostructures that can be used in water treatment. The functionalization of macrostructures of engineered nanomaterials with antimicrobials for prevention of biofouling or removal of pathogens from contaminated waters will also be discussed.

Plenary Lecture on Diversity, Equality & Inclusiveness

Pentland Auditorium *9:50 - 10:20*
Chair: *Tiina Roose (*University of Southampton)

Adriana Paluszny

Imperial College London, *UK*

Watson Forum: A career in (porous media) modelling

This talk will discuss the Watson Forum Project, a series of informal interviews that seek to highlight the contributions of women in STEM. The mission of the 3-4 min videos is to inspire individuals to pursue lasting careers in the context of maths, physics, earth sciences, and engineering, and aims to project accessible women-in-science role models to the world.

The Watson Forum was developed in 2016 to foster a sense of community among women in the fields of numerical modelling, simulation, and programming, and create a sparse but permanent and accessible record of the women who work in this area. Many of the women interviewed for the Watson Forum are from the fields of earth sciences and porous media, and interviewees often have hybrid careers that combine numerical and analytical modelling with other activities, such as experimental and field work.

Those who participate as interviewees become a part of it, which develops the community among the growing number of featured role models. This talk will describe the project (https://www.youtube.com/c/modellingcareers), and its reach, as well as the motivations that led to its development, and the impact that it has had.

Coffee Break

Cromdale Hall 10:20 - 10:50

Oral presentations: Parallel sessions 1.1
10:50 - 12:35

MS01: Porous Media for a Green World: Energy & Climate - *Part 1*

Tinto

Chairs: *William Rossen, Kai Li*

10:50	[509] **Effect of rock heterogeneity on pore-scale fluid displacement in a layered sandstone for underground hydrogen storage** *Zaid Jangda, Hannah Menke, Andreas Busch, Sebastian Geiger, Tom Bultreys, Kamaljit Singh*
11:05	[1000] **Ostwald Ripening Investigation using 3D Micro-CT Imaging** *Waleed Dokhon, Yihuai Zhang, Martin Blunt, Branko Bijeljic,*
11:20	[94] **Energy Storage in Unconventional Formations** *Hanin Samara, Tatjana von Ostrowski, Philip Jaeger*
11:35	[261] **Impact of capillary pressure hysteresis on Underground Hydrogen Storage** *Farzaneh Nazari, Shokoufeh Aghabozorgi Nafchi, Rouhi Farajzadeh, Vahid Niasar*
11:50	[957] **Visualizing the Effect of Gravity on Hydrogen Redistribution at Pore Scale** *Omid Shahrokhi, Amir Jahanbakhsh, Puyan Bakhshi, John Andresen, M. Mercedes Maroto-Valer*
12:05	[871] **Trapping, Hysteresis and Ostwald Ripening in Hydrogen Storage: A Pore-Scale Imaging Study** *Sepideh Goodarzi, Branko Bijeljic, Martin Blunt, Guanglei Zhang, Yihuai Zhang*
12:20	[751] **Microfluidic hydrogen storage capacity and residual trapping during cyclic injections** *Maksim Lysyy, Na Liu, Celine M. Solstad, Martin Ferno, Geir Ersland*

MONDAY, 22 MAY 2023

Oral presentations: Parallel sessions 1.1, cont.

10:50 - 12:35

MS22: Manufactured Porous Materials for Industrial Applications - *Part 1*

Carrick

Chairs: *Vahid Niasar, Senyou An*

10:50	[977] **Advancing modeling and simulation of batteries at different scales** *Oleg Iliev, Konrad Steiner, Jochen Zausch*
11:05	[22] **Noble metal coated high-aspect-ratio nanopore arrays and porous nanotube networks for catalysis in chemical synthesis and fuel cells** *Wolfgang Ensinger, Manfred E. Ensinger*
11:20	[349] **Towards multiphase transport layers - Binary pore size distributions with hydrogen bubble assisted electrodeposition** *Adrian Mularczyk, Daniel Niblett, Adam Wijpkema, Martin de Waal, Marc van Maris, Antoni Forner-Cuenca*
11:35	[851] **Removing size effect on 3D-printed material's strength by controlling its microstructure** *Xinrui Zhang, Martin Lesueur*
11:50	[511] **Interaction of bubble dynamics and manufactured porous electrodes in flow through membraneless water electrolysis** *Daniel Niblett, Mohamed Mamlouk*
12:05	[996] **Direct fabrication of porous 3D microstructures on silicon wafers for MEMS applications** *Olaf Andersen, Cris Kostmann, Thomas Lisec, Thomas Weißgärber*
12:20	[352] **Scan Line Patterning: An Efficient Approach to Achieve Periodic Open Cell Structures in Selective Laser Melting** *Alexander Limper, Anselm Brodersen, Matthias Wessling, John Linkhorst*

Oral presentations: Parallel sessions 1.1, cont.

10:50 - 12:35

MS03: Flow, transport and mechanics in fractured porous media - *Part 1*

Lammermuir 1

Chairs: *Holger Steeb & Hamid Nick*

10:50	[518] **Multicontinuum non-equilibrium theory for coupled flow and deformation in fractured rocks** *Marco Dentz, Sandro Andrés Martínez, Luis Cueto-Felgueroso*
11:05	[474] **Shear Displacement Predictions in Fractured Rock Based on Global vs. Resolved Stress** *Giulia Conti, Michael Liem, Stephan Matthai, Patrick Jenny*
11:20	[435] **New algorithms for numerical simulation of multiple hydraulic fractures in low permeability rocks** *Yuxiao Wang, Akbar Javadi, Corrado Fidelibus*
11:35	[46] **Multiscale poromechanical model for naturally fractured coal seam reservoir considering non-linear fracture deformation and adsorption effects** *HA Quoc Dat, Tien Dung Le, Irina Panfilov, Christian Moyne, Marcio Murad*
11:50	[692] **Developing Methods to Assess Changes in Mechanical Properties of Shale Modified by Engineered Mineral Precipitation** *Kayla Bedey, Matthew Willett, Laura Dobeck, Joe Eldring, Dustin Crandall, Johnathan Moore, Jonny Rutqvist, Al Cunningham, Adrienne Phillips, Catherine Kirkland*
12:05	[50] **A generalised phase-field model for fluid-driven dynamic fracture propagation in porous media** *Kou Du, Alex Routh*
12:20	[257] **Numerical simulation of hydroshearing in fractured crystalline rock at the Bedretto Underground Laboratory (Switzerland)** *Iman Vaezi, Andrés Alcolea, Peter Meier, Francesco Parisio, Jesus Carrera, Victor Vilarrasa*

MONDAY, 22 MAY 2023

Oral presentations: Parallel sessions 1.1, cont.
10:50 - 12:35

MS13: Fluids in Nanoporous Media - *Part 1*
Lammermuir 2
Chairs: *Bin Pan & Elizabeth Barsotti*

10:50	[607] **Adsorbed Layer Transport Dominates Thin Film Evaporation in Nano Scale Confinements** *Ali Beskok, Mustafa Ozsipahi*
11:05	[364] **Bicontinuous Microemulsion in Porous Matrices** *Margarethe Dahl, René Haverkamp, Larissa Doll, Thomas Hellweg, Stefan Wellert*
11:20	[109] **Fluid transfers in nanopores through dynamic NMR relaxometry** *Benjamin Maillet, Philippe Coussot, Rahima Sidi-Boulenouar*
11:35	[533] **Spontaneous and electrocapillary imbibition dynamics in nanoporous media** *Bin Pan*
11:50	[431] **Nanometer-scale wetting of micro- and meso-porous carbons: a time-resolved synchrotron small-angle scattering analysis** *François Chaltin, Mouna Hamid, Bart Goderis, Cédric Gommes*
12:05	[822] **Dynamical and thermodynamic aspects of evaporation of solutions from nanoporous media** *joachim trosseille, HUGO BELLEZZA, Sujeet Dutta, Olivier Vincent*
12:20	[642] **Investigation of Catalyst Layer and Microporous Layer Liquid Water Saturation Level in Polymer Electrolyte Fuel Cell by Operando Small&Wide Angle X-ray Scattering** *Kinanti Hantiyana Aliyah, Anne Berger, Timon Lazaridis, Christian Appel, Andreas Menzel, Hubert Gasteiger, Felix N. Büchi, Lorenz Gubler, Jens Eller*

Oral presentations: Parallel sessions 1.1, cont.

10:50 - 12:35

MS06-A: Physics of multiphase flow in diverse porous media - *Part 1*

Monteith

Chairs: *Saman Aryana & Signe Kjelstrup*

10:50	[262] **Derivation of 2-Phase Darcy Equations from Pore Scale Energy Dynamics using Non-Equilibrium Thermodynamics** *James McClure, Ming Fan, Steffen Berg, Ryan Armstrong, Carl Fredrik Berg, Zhe Li, Thomas Ramstad*
11:05	[468] **Homogenized Lattice Boltzmann Model for Simulating Multi-Phase Flows in Heterogeneous Porous Media** *Martin Lautenschläger, Benjamin Kellers, Julius Weinmiller, Timo Danner, Arnulf Latz*
11:20	[417] **A Thermodynamically Consistent Model for Compositional Multiphase Flows** *Farid SMAI*
11:35	[303] **NAPL dissolution and transport in porous media: Upscaling the Mass Exchange Coefficient** *Narges Dashtbesh, Anne-Julie Tinet, Fabrice GOLFIER, Constantin Oltean, Michel Quintard*
11:50	[593] **Upscaled model for two-phase flow in porous media** *Didier Lasseux, Francisco J. Valdés-Parad*
12:05	[949] **Pseudo-Thermodynamics of Immiscible Two-Phase Flow in Porous Media: Differential Geometry and Convenient Coordinates** *Håkon Pedersen, Alex Hansen*
12:20	[665] **Two-phase non-linear flow in Pore Network Model** *Federico Lanza, Alex Hansen, Laurent Talon, Alberto Rosso, Andreas Hennig, Santanu Sinha*

MONDAY, 22 MAY 2023

Oral presentations: Parallel sessions 1.1, cont.
10:50 - 12:35

MS17: Thermal Processes, Thermal Coupling and Thermal Properties of Porous Media: modeling and experiments at different scales - *Part 1*

Harris

Chairs: *Yingfang Zhou & Moran Wang*

10:50	[146] **Simulation Study of In-situ Conversion Process in Low-mid Maturity Shale Oil Reservoir** *Zijie Wang, Jun Yao, Hai Sun, Xia Yan*
11:05	[155] **Arctic bryophytic cover seen as a porous medium: coupled experimental and numerical thermal properties' assessment** *Simon Cazaurang, Manuel MARCOUX, Michel Quintard, Laurent Orgogozo*
11:20	[500] **On talik formation related to geological radioactive waste storage** *Klaus-Peter Kröhn*
11:35	[571] **Thermodiffusion and thermo-osmosis in porous media** *Bjorn Hafskjold, Dick Bedeaux, Signe Kjelstrup, Øivind Wilhelmsen, Emma Kirsti Anna Ditaranto*
11:50	[636] **A novel local-minima 3D image segmentation method for fluid flow in low-resolution porous material images** *Rui Li, Yi Yang, Wenbo Zhan, Jianhuy Yang, Yingfang Zhou*
12:05	[696] **Thermal properties of unconsolidated sediments and borehole back fill materials for ground source thermal energy systems** *Cjestmir Hockin, Zanne Korevaar, Jan Diederik van Wees, Stefanie Bus, Ruud Schotting*
12:20	[831] **Monte Carlo method to solve the heat equation in a complex media** *Alicia Laroche, Jose Luis Limon Farfan, Simon Eibner, Stéphane Blanco, Christophe Coustet, Mouna El Hafi, Richard Fournier, Benjamin Piaud, Frédéric Topin*

Oral presentations: Parallel sessions 1.1, cont.

10:50 - 12:35

MS09: Pore-scale modelling - *Part 1*

Lowther

Chairs: *Stephane Zaleski & Ke Xu*

10:50	[17] **A Lubrication Model for Wettablity Characterization** *Mojtaba Norouzisadeh, Philippe Leroy, Mohamed Azaroual, Cyprien Soulaine*
11:05	[18] **Dispersion of a passive scalar around a confined bubble** *Davide Picchi, Pietro Poesio*
11:20	[26] **Deep learning aided pore scale modelling** *Peyman Mostaghimi, Ying Da Wang, Tang Kunning, Ryan Armstrong*
11:35	[939] **Thermodynamic properties of ganglia in heterogeneous porous media** *Chuanxi Wang, Ke Xu*
11:50	[56] **Pore-scale simulation of hydrogen transport in porous media** *Leila Hashemi, Rainer Helmig, Cornelis Vuik, Hadi Hajibeygi*
12:05	[860] **Development of a thermodynamically-based pore-scale network model to simulate fluid intermittency during two-phase flow.** *Ademola Adebimpe, Martin Blunt, Branko Bijeljic, Sajjad Foroughi*
12:20	[173] **Direct numerical simulations of turbulent flows over a water saturated porous medium: How two phase pore flow forms roughness at a permeable surface** *Johannes Müller, Bernhard Weigand, Hanchuan WU, Martin Schneider, Rainer Helmig*

MONDAY, 22 MAY 2023

Oral presentations: Parallel sessions 1.1, cont.
10:50 - 12:35

MS14: Uncertainty Quantification in Porous Media
Ochil

Chairs: *Rodrigo Weber dos Santos & Michele Botti*

10:50	[345] **Roles of Transport Mechanisms and Model Parameters in Gas Flow Migration across low-permeability porous media** *Leonardo Sandoval, Alberto Guadagnini, Monica Riva, Ivo Colombo*
11:05	[640] **Improved techniques for uncertainty quantification of foam flow in porous media** *Luisa Silva Ribeiro, Berilo de Oliveira Santos, Gabriel Brandão de Miranda, Grigori Chapiro, Bernardo Rocha, RODRIGO Weber dos SANTOS*
11:20	[825] **Dynamic Mode Decomposition for model reduction of flow and transport in porous media** *Valentina Ciriello, Giulia Libero, Daniel Tartakovsky*
11:35	[63] **Chemical and morphological uncertainty quantification by auto-weighted Bayesian Physics-Informed Neural Networks for reactive two-scale porous media at the pore scale** *Sarah PEREZ, Philippe Poncet*
11:50	[475] **Prior ensemble based on geomechanical far-field approximations for data assimilation with ES-MDA in naturally fractured reservoirs** *Michael Liem, Giulia Conti, Stephan Matthai, Patrick Jenny*
12:05	[768] **Techniques for the estimation of hydrogeological parameters in a cluster of infiltration ponds** *Marco Berardi, Francesco Di Lena, Rita Masciale, Giuseppe Passarella*
12:20	[954] **Multiphase Flow Effects on a Physics-Based Shale Reservoir Production Forecasting Model: A Global Sensitivity Analysis** *Daniela Arias Ortiz, Tadeusz Patzek*

Diversity, Equality & Inclusiveness Workshop

Lennox Suite 12:35 - 13:45

Join us for this workshop, open and free to all participants.
Lunch will be distributed inside the lecture hall prior to the event.

Panel Members:

Adriana Paluszny (Chair)
Imperial College London, *UK*

Raffaella Ocone
Heriot-Watt University, *UK*

Sebastian Geiger
Delft University of Technology, *NL*

Anna Herring
University of Tennessee, *US*

Kamaljit Singh
Heriot-Watt University, *UK*

DO YOU KNOW....EDINBURGH?

Royal Yacht Britannia

Edinburgh is home to the Royal Yacht Britannia. The three-mast, 412-foot-long yacht was the British Monarchy's vessel from 1953, when she was launched by Queen Elizabeth II, until her decommission in 1997. During her 43-year career, she conveyed the Queen and other members of the Royal family on more than 900 visits and travelled more than a million nautical miles around the world. It is said that Her Majesty shed a tear at the decommissioning ceremony that was attended by most of the senior members of the Royal Family.

Britannia is now a visitor attraction moored in the historic port of Leith in Edinburgh, explored by more than 300,000 people every year. The visit across her five decks will take you past the crewmen quarters and the Royal Apartments, while the numerous rare items and photographs on display will give you an exclusive look into the Royal family and Royal Yachtsmen (Yotties) lives when at sea. A must on your to-do list when you are in Edinburgh.

MONDAY, 22 MAY 2023

Oral presentations: Parallel sessions 1.2

13:45 - 15:45

MS02: Porous Media for a Green World: Water & Agriculture

Tinto

Chairs: *Nima Shokri & Stefanie Kiemle*

13:45	[443] **Multiscale porous media approach to simulate shadowing and transpirative cooling effect of urban vegetation** *Aytaç Kubilay, Yongling Zhao, Léopold Giroux-Gauthier, Dominique Derome, Jan Carmeliet*
14:00	[460] **Non-invasive monitoring of subflorescent magnesium sulfate crust formation in porous media** *Joseph Piotrowski, Andreas Pohlmeier, Dongwon Lee, Holger Steeb, Johan Alexander Huisman*
14:15	[544] **Combining floods and droughts - Mitigation of the effects of climate change on the local water balance** *Thomas Baumann, Lea Augustin, Annette Dietmaier*
14:30	[805] **Functional Biochar for Contaminant Removal from Water** *Haiyan Zhang, Guoting Li, Tannaz Pak*
14:45	[846] **Characterization of evaporation induced aquifer-scale mixing and mineral precipitation** *Marco Pieretti, Luis Cueto-Felgueroso, Elena Abarca*
15:00	[869] **A hydrogel-soil system to enhance plant water uptake** *Pooria Ghadir, Matteo Pedrotti*
15:15	[907] **The role of root hairs in root water uptake - Insights from an image-based 3D model** *Patrick Duddek, Mutez A. Ahmed, Mathieu Javaux, Jan Vanderborght, Andrea Carminati*
15:30	[945] **S table water isotopologue fra ctionation during soil water evaporation: Analysis using a coupled soil atmosphere model** *Stefanie Kiemle, Katharina Heck, Edward Coltman, Rainer Helmig*

Oral presentations: Parallel sessions 1.2, cont.

13:45 - 15:45

MS18: Innovative Methods for Characterization, Monitoring, and In-Situ Remediation of Contaminated Soils and Aquifers

Carrick

Chairs: *Tannaz Pak & Carlo Bianco*

13:45	[620] **Assessing the fate of PFAS in subsurface from experimental studies and numerical simulations at soil-column scale** *Anastasios Melitsiotis, Nadia Bali, Maria Theodoropoulou, Christos Tsakiroglou*
14:00	[486] **Modeling dehalogenation of diatrizoate by sulfide-modified nano-scale zero-valent iron in natural porous media.** *Angeliki Koupa, Monica Riva, Alberto Guadagnini*
14:15	[132] **EXAMINING THE FEASIBILITY OF USING ZERO-VALENT BIMETALS FOR THE TREATMENT OF TRICHLOROETHYLENE VAPORS IN THE UNSATURATED ZONE** *Clarissa Settimi, Daniela Zingaretti, Iason Verginelli, Renato Baciocchi*
14:30	[97] **Foam for Soil Remediation: Similarities and Differences with Foam for Hydrocarbon Recovery** *William Rossen, Henri Bertin, Olivier Atteia*
14:45	[621] **4D Study of Groundwater Remediation Techniques at Pore-scale** *Pavel Kazakovtsev, Tannaz Pak, Meezanul Islam, Nathaly Lopes Archilha*
15:00	[609] **The effect of upscaling the reaction rate on predictive modeling in subsurface processes** *Javad Shokri, Theresa Schollenberger, Senyou An, Bernd Flemisch, Vahid Niasar*
15:15	[743] **Remediation of oil drilling cuttings by dielectric barrier discharge plasma** *Christos Aggelopoulos, Stavroula Kavouri, Mary Dourou, Christos Tsakiroglou*
15:30	[752] **On clean-up of iodinated X-ray contrast media agents from surface waters** *Stefano Seccia, Mohaddeseh Mousavi Nezhad, Gustave Denis*

MONDAY, 22 MAY 2023

Oral presentations: Parallel sessions 1.2, cont.

13:45 - 15:45

MS03: Flow, transport and mechanics in fractured porous media - *Part 2*

Lammermuir 1

Chairs: *Holger Steeb & Hamid Nick*

13:45	[32] **Linkage between extended poroelasticity and micromechanics** *Filip Adamus, David Healy, Phil Meredith, Tom Mitchell*
14:00	[495] **A six (+1) field formulation for flow in porous media with fractures and barriers** *Stefano Scialò*
14:15	[708] **Multipoint mixed FEM for rotation-based poroelasticity with faults** *Alessio Fumagalli, Wietse Boon, Anna Scotti*
14:30	[224] **A discontinuous approximation for modeling multiphase flow and transport in complex porous media structures** *Jumanah Al Kubaisy, Pablo Salinas, Christopher C. Pain, Jackson Matthew*
14:45	[60] **A New Upscaling Strategy for Flow in Fractured Porous Media** *Daniel Stalder, Daniel Meyer, Patrick Jenny*
15:00	[82] **Modeling Matrix-Fracture Fluid Leakage in Fractured Rocks Using Multi-Scale Darcy-Brinkman-Stokes Approach** *Xiang Rao, Xupeng He, Zhen Zhang, Yiteng Li, Marwa AlSinan, Hyung Kwak, Hussein Hoteit*
15:15	[536] **Single-phase flow simulations in large-scale fractured porous media : solver challenges** *Michel Kern, Géraldine Pichot, Martin Vohralik, Daniel ZEGARRA VASQUEZ*
15:30	[382] **Impact of artificial topological changes on flow and transport through fractured media due to mesh resolution** *Aleksandra Pachalieva, Matthew Sweeney, Jeffrey Hyman, Emily Stein, Rosie Leone, Hari Viswanathan*

Oral presentations: Parallel sessions 1.2, cont.

13:45 - 15:45

MS08: Mixing, dispersion and reaction processes across scales in heterogeneous and fractured media - *Part 1*

Lammermuir 2

Chairs: *Marco Dentz & Branko Bijeljic*

13:45	[37] **A Geo-structurally Based Correction Factor for Apparent Dissolution Rates in Fractured Media** *Jeffrey Hyman, Alexis Sitchler, Bill Carey, Satish Karra, Hari Viswanathan, Matthew Sweeney, Elizabeth Andrews*
14:00	[212] **Cooling of CO2-rich geothermal fluids: A mechanism for cave systems formation** *Roi Roded, Einat Aharonov, Amos Frumkin, Nurit Weber, Boaz Lazar, Piotr Szymczak*
14:15	[71] **Quantification of the impact of acidified brine on fracture-matrix transport in a naturally fractured shale using in situ imaging and modeling** *Christopher Zahasky, Manju Pharkavi Murugesu, Takeshi Kurotori, Collin Sutton, Jennifer Druhan, Bolivia Vega, Sally Benson, Anthony Kovscek*
14:30	[89] **Adaptive models for nonlinear flows in highly heterogeneous porous media** *Francesco Patacchini, Alessio Fumagalli*
14:45	[472] **Dispersion in porous media gravity currents experiencing drainage** *Saeed Sheikhi, Morris Flynn*
15:00	[55] **Experimental and numerical investigation on convective mixing in porous media flows** *Marco De Paoli, Christopher Howland, Roberto Verzicco, Detlef Lohse*
15:15	[157] **Three-Dimensional Imaging of Density-Driven Convection in Consolidated Rock Samples Using X-Ray CT Scanning** *Anna-Maria Eckel, Ronny Pini*
15:30	[932] **Rayleigh-Darcy convection in a three-dimensional granular medium: an experimental study** *Shabina Ashraf, Jaybrata Dhar, Francois Nadal, Patrice Meunier, Yves Méheust*

MONDAY, 22 MAY 2023

Oral presentations: Parallel sessions 1.2, cont.

13:45 - 15:45

MS06-B: Interfacial phenomena across scales - *Part 1*

Monteith

Chairs: *Eduardo Abreu, Ran Holtzman & Kamaljit Singh*

13:45	[259] **Pore-scale mass transfer model of capillary trapping dissolution based on Sherwood, Reynolds, and Schmidt number** *Aninditya Patmonoaji, Yingxue Hu, Tetsuya Suekane*
14:00	[347] **Deformation-driven collapse of gas cavities in a soft porous medium** *Oliver Paulin, Liam Morrow, Matthew Hennessy, Chris MacMinn*
14:15	[785] **Bubble Coarsening Kinetics in Porous Media** *Yuehongjiang Yu, Chuanxi Wang, Yashar Mehmani, Ke Xu*
14:30	[1066] **Use of surfactants to enhance the CO2 storage capacity in the geologic carbon storage** *Lee Joo Yong, Ryou Jae Eun, Min-Kyung Jeon, Jongwon Jung, Tae-Hyuk Kwon, Park Yongchan*
14:45	[398] **Interfacial interaction of a porous periodic topology adjacent to a turbulent fluid flow by highly resolved PIV measurements** *Tobias Fuhrmann, Rico Poser, Bernhard Weigand, Grazia Lamanna*
15:00	[861] **Singularities and surprises in porous media models of interfacial non-Newtonian flows** *Prabir Daripa*
15:15	[446] **Impact of CO2 concentration in gas phase on foam behavior in carbonate rocks** *Juliana Maria da Fonseca Façanha, Aurora Pérez, Leandro Freitas Lopes*
15:30	[510] **The traveling wavefront for foam flow in multi-layer porous media** *Grigori Chapiro, Luis Fernando Lozano Guerrero, Andrés Castrillón Vásquez, Jhuan Cedro, Weslley da Silva Pereira*

Oral presentations: Parallel sessions 1.2, cont.

13:45 - 15:45

MS21: Non-linear effects in flow and transport through porous media - *Part 1*

Harris

Chairs: *Mohaddeseh Mousavi Nezhad & Yves Méheust*

13:45	[144] **Inertial solution for high-pressure-difference pulse decay measurement through microporous media** *Moran Wang, Tian Zhiguo*
14:00	[321] **The role of temporal and spatial fluctuations for scalar transport at the interface between a free turbulent flow and a porous medium** *Simon v. Wenczowski, Michael Manhart*
14:15	[590] **Dynamics of $A+B \to C$ chemical reaction fronts in finite radial geometry** *Darío Martin Escala, Anne De Wit, Fabian Brau*
14:30	[672] **Understanding pre-Darcy flow and velocity-dependent permeability in porous rocks through neutron imaging** *Fernando Vieira Lima, Stephen Hall, Erika Tudisco, Jonas Engqvist, Robin Woracek, Stefanos Athanasopoulos, Philip Vestin, Jan Hovind*
14:45	[420] **Non-linear flow phenomena in a porous cylindric microtube** *Florian Cajot, Philippe Beltrame*
15:00	[363] **Traveling wave solutions describing the foam flow in porous media for low surfactant concentration** *Luis Fernando Lozano Guerrero, Grigori Chapiro, Rosmery Quispe Zavala*
15:15	[697] **Effect of yield stress in a two phase pore network model** *Andreas Hennig, Federico Lanza, Alex Hansen, Laurent Talon, Santanu Sinha, Alberto Rosso*
15:30	[603] **Convection in Salt Lakes** *Matthew Threadgold, Cédric Beaume, Lucas Goehring, Steven Tobias*

MONDAY, 22 MAY 2023

Oral presentations: Parallel sessions 1.2, cont.

13:45 - 15:45

MS09: Pore-scale modelling - *Part 2*

Lowther

Chairs: *Leila Hashemi & Hang Deng*

13:45	[1067] **Residual bubbles' local equilibrium after coarsening** *Chuanxi Wang, Ke Xu, Yashar Mehmani, Yuehongjiang Yu*
14:00	[180] **Study on Convective Drying of Porous Media – Comparison of Phase Field Simulations with Micro-model Experiments** *Lukas Maier, Sebastian Brosch, John Linkhorst, Matthias Wessling, Ulrich Nieken*
14:15	[181] **Starting from the bottom: Coupling a genetic algorithm and a pore network model for porous electrode optimization** *Maxime van der Heijden, Rik van Gorp, Gabor Szendrei, Victor de Haas, Amin Sadeghi, Jeffrey Gostick, Antoni Forner-Cuenca*
14:30	[277] **Image-based pore-scale simulations of nuclear magnetic resonance response for enhanced reservoir characterization** *Matheus Ribeiro, Jefferson Filgueiras, André Souza, Pedro Lopes, Pedro Vianna, André Pereira, Rodrigo Bagueira, Ricardo Leiderman*
14:45	[393] **Numerical modeling of evaporation-condensation in nanoporous media by SPH method** *Nathan AMROFEL, Magdalena Dymitrowska, Amael Obliger, Anne-Julie Tinet, Fabrice GOLFIER*
15:00	[403] **Turbulent transport across the sediment-water interface: Pore-resolved direct simulations and upscaled modeling** *Shashank Karra, Sourabh Apte*
15:15	[406] **Stochastic Methods for the Generation of Granular Porous Media with Conditional Heterogeneity** *Thomas Seers, Harris Rabbani*
15:30	[51] **Gyroid structures with topology-optimised mechanical properties designed by simulations** *Leonie Wallat, Michael Selzer, Frank Poehler, Britta Nestler*

Oral presentations: Parallel sessions 1.2, cont.

13:45 - 15:45

MS15: Machine Learning and Big Data in Porous Media - *Part 1*

Ochil

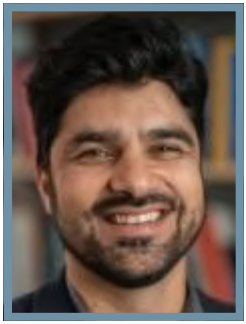
Chairs: *Hongkyu Yoon & Teeratorn Kadeethum*

13:45	[727] **Explicit Physics-Informed Neural Networks for Nonlinear Closure: The Case of Transport in Tissues** *Brian Wood, Byrne Helen*
14:00	[898] **3D Reconstruction of Porous materials using Deep Learning** *Serveh Kamrava, Hossein Mirzaee*
14:15	[344] **Physical residual neural networks for reduced order modelling of reactive flow in porous media** *Ahmed H. Elsheikh, Hannah Menke, Julien Maes*
14:30	[400] **Fast Physics Informed Surrogate Models for Fluid Flow in Porous Media: Learning Operators using DeepONets** *Waleed Diab, Mohammed Saad Al Kobaisi*
14:45	[452] **Physics Informed Machine Learning Methods For Production Forecast** *Roman Manasipov, Denis Nikolaev, Ramez Abdalla, Dmitrii Didenko*
15:00	[974] **Physics informed neural networks based on sequential training for CO$_2$ utilization and storage in subsurface reservoir** *Kiarash Mansourpour, Denis Voskov*
15:15	[166] **Physics-informed machine learning application for heterogeneous permeability estimation in 3D sandbox experiments** *Hongkyu Yoon*

MONDAY, 22 MAY 2023

Coffee Break
Strathmore Hall 15:45- 16:15

Invited Parallel Lecture 1
Pentland Auditorium *16:15 - 16:50*
Chair: *Hadi Hajibeygi* (TU Delft)



Shervin Bagheri *16:15 - 16:45*
KTH Royal Institute of Technology, *Sweden*

Stability and functionality of immobilised liquid-liquid interfaces in periodic structured media

In this talk, I will discuss how liquid-liquid interfaces can be stably locked into periodic structured porous substrates and used for controlling the transfer of momentum, heat and mass with an external flow. First, we address the behavior of liquid-liquid interfaces locked in textured surfaces and exposed to an external shear flow. When the liquid-liquid interface remains stable, these surfaces can enhance heat and mass exchange with a bulk flow and reduce flow drag and biofouling. We demonstrate how shear stresses and soluble surfactants modify the dynamics of the liquid-liquid interface, resulting in waves, drainage and Marangoni stresses, all of which significantly affect transport processes with the external flow. Second, we introduce systems with liquid-liquid interfaces locked in three-dimensional periodic porous scaffolds. By tuning the wettablity and introducing appropriate “fluid traps”, we can immobilize interfaces of different morphologies, including spherical droplets or diamond-shaped structures. These multi-phase materials are remarkably stable and provide a very high area-to-volume ratio. We will discuss their potential as flow-continuous heterogeneous catalysis and for other applications that require optimizing mass transfer across interfaces, such as CO2 capture.

Learn about Thermo Fisher *13:30 - 13:35*

Invited Parallel Lecture 2

Moorfoot/Kilsyth *16:15 - 16:50*

Chair: *Joo Yong Lee* (Korea Institute of Geoscience and Mineral Resources)

Raffaella Ocone

Lecture Hall 2 *16:15 - 16:45*

Heriot-Watt University, *UK*

The Rheology of Granular Media: from Engineering to Geological Applications

Granular materials exhibit a broad range of intricate dynamic behaviours. The study of their hydrodynamics is extremely relevant in the chemical and process industries, where those materials are widely handled and produced. Understanding how internal (e.g., particles size and shape) and external (e.g., applied stresses, moisture content) physical properties impact on the flow behaviour of solid particles helps industrial practitioners handle and produce particulates in an efficient and less costly way. Building upon previous findings applied to the process industry, the talk explores the challenges associated with the dynamic behaviour of dry and wet granular material and discusses recent experimental and modelling efforts on the flowability of pyroclastic powders. Pyroclastic powders are investigated with the aim of predicting and managing the hazard resulting from volcaniclastic debris flows, natural phenomena which occur when a mixture of pyroclastic fallout/current deposits and water move down slopes under the action of gravity.

Teledyne ISCO - Pump With More Capabilities *13:30 - 13:35*

DO YOU KNOW....EDINBURGH?

Royal Botanic Garden

Edinburgh is home to the Royal Botanic Garden, one of the finest botanic gardens in the world. Situated just one mile from the city center, the Garden offers fantastic views of the capital's skyline, featuring Edinburgh Castle and the Scott Monument. It is famous for its Chinese Hillside, Rock Garden and Scottish Native Plants Collection, offering peace and tranquility to its 2 million visitors per year, free of charge.

MONDAY, 22 MAY 2023

Oral presentations: Parallel sessions 1.3
17:00 - 18:00

MS01: Porous Media for a Green World: Energy & Climate - *Part 2*
Tinto
Chairs: *Kai Li & Anna Herring*

17:00	[753] **Underground hydrogen storage and in-situ gas conversion: macroscopic investigation on reactive transport mechanisms** *Gerald Stiedl, Boris Jammernegg, Holger Ott*
17:15	[264] **Geochemical reactions of iron oxides with hydrogen in the porespace of sandstones: Processes, kinetics & limitations of the extent of reaction.** *Christian Ostertag-Henning*
17:30	[592] **Impact of microbial activity on hydrogen transport in porous reservoirs across scales** *Maartje Boon, Ivan Buntic, Kadir Ahmed, Nicole Dopffel, Hadi Hajibeygi*
17:45	[896] **Pore-scale observations of hydrogen trapping and migration in porous rock** *Yihuai Zhang, Branko Bijeljic, Ying Gao, Sepideh Goodarzi, Sajjad Foroughi, Martin Blunt*

MS05: Biochemical processes and biofilms in porous media - *Part 1*
Carrick
Chairs: *Eleonora Secchi & Veronica Morales*

17:00	[101] **Life in a tight spot: How bacterial populations spread through porous media** *Sujit Datta*
17:15	[516] **Bacterial Accumulation near Residual Organic Pollutants in Micropockets of Porous Media Depends on Chemotaxis and Pore Water Velocity** *Beibei Gao, Roseanne Ford*
17:30	[837] **Using Branching Fungus to Remediate NAPLs Trapped in Hard-to-reach Areas in Fractured Porous Media** *Sang Lee, Marcel Moura, Shreya Srivastava, Cara Santelli, Peter Kang*
17:45	[686] **In Situ Bioremediation of Selenium and Nitrate for Full Scale Treatment of Mine Waste in the Elk Valley, British Columbia** *Brent Peyton, Lisa Kirk, M. Jim Hendry*

Oral presentations: Parallel sessions 1.3, cont.

17:00 - 18:00

MS03: Flow, transport and mechanics in fractured porous media - *Part 3*

Lammermuir 1

Chairs: *Holger Steeb & Hamid Nick*

17:00	[61] **Visualising Two-Phase Flow in a Natural Geological Fracture Using Synchrotron Imaging** *Tomos Phillips, Tom Bultreys, Kamaljit Singh, van Stappen Jeroen, Ben Callow, Vladimir Bovak, Christian Matthias Schlepuetz, Stefanie Van Offenwert, Veerle Cnudde, Andreas Busch*
17:15	[993] **Particle-laden fluid flow in fractures: particle transport, deposition and clogging** *Ahmed Hafez, Qi Liu, Thomas Finkbeiner, J. Carlos Santamarina*
17:30	[879] **Elastic normal fracture deformation in thermoporomechanical media** *Ivar Stefansson*
17:45	[520] **The importance of understanding hydrothermal alteration in fault related geothermal systems in Cornwall** *Nathaniel Forbes Inskip, Nick Harpers, Hannes Claes, Sabine den Hartog, Andreas Busch*

Oral presentations: Parallel sessions 1.3, cont.

17:00 - 18:00

MS08: Mixing, dispersion and reaction processes across scales in heterogeneous and fractured media - *Part 2*

Lammermuir 2

Chairs: *Mohammad Nooraiepour & Marco Dentz*

17:00	[216] **Modelling anomalous diffusion in semi-infinite disordered systems and porous media** *Ralf Metzler, Ashish Rajyaguru, Brian Berkowitz*
17:15	[311] **Advective trapping in the flow through composite heterogeneous porous media** *Juan J. Hidalgo, Insa Neuweiler, Marco Dentz*
17:30	[524] **Generating synthetic images of unsaturated porous media with a multiscale multipoint statistics approach to study transport in two-fluid-phase systems** *Laurent Talon, Emma Ollivier-Triquet, Daniela Bauer, Benjamin Braconnier, Souhail Youssef, Véronique GERVAIS*
17:45	[188] **Topological Control on Flow and Transport in Unsaturated Porous Media from Temporally Resolved 3D X-ray Computed Micro-tomography** *Andres Felipe Velasquez Parra, Michele Griffa, Rolf Kaufmann, Federica Marone, Joaquin Jimenez-Martinez*

MONDAY, 22 MAY 2023

Oral presentations: Parallel sessions 1.3, cont.

17:00 - 18:00

MS06-A: Physics of multiphase flow in diverse porous media - *Part 2*

Monteith

Chairs: *Mohammad Masoudi & Ryan Armstrong*

17:00	[836] **Tortuosity-governed droplet transport in a microfluidic porous network** *Elliot SPEIRS, nicolas PANNACCI, Maxime Moreaud, Marie-Caroline Jullien*
17:15	[848] **A simplified pore-scale model for drainage including film flow effects** *Paula Reis, Marcel Moura, Knut Jørgen Måløy, Eirik Grude Flekkøy, Per Arne Rikvold*
17:30	[190] **Model of water drop infiltration in porous media with amphiphilic matter** *Florian Cajot, Philippe Beltrame, Annette BERARD, Claude DOUSSAN*
17:45	[876] **Capillary entry pressure in soft porous media** *Callum Cuttle, Chris MacMinn*

MS17: Thermal Processes, Thermal Coupling and Thermal Properties of Porous Media: modeling and experiments at different scales - *Part 2*

Harris

Chairs: *Moran Wang & Yingfang Zhou*

17:00	[565] **Heat Extraction at High Flow Rates by Fracture Plugging in Geothermal Reservoirs from Pore to Darcy Scale Considering Local Thermal Non-Equilibrium (LTNE) Conditions** *Yashar Tavakkoli Osgouei, Mehmet Onur Doğan, Serhat Akin*
17:15	[353] **Investigation on the impact of thermo-osmosis on fluid pressurisation in Boom clay – a case study of the ATLAS in-situ full-scale heating experiment.** *Feliks Kiszkurno, Thomas Nagel, Jörg Buchwald, Olaf Kolditz*
17:30	[552] **Model Development for Thermal Management of Li-Ion Batteries from Cell Level to Total System Level** *Mehmet Onur Doğan*
17:45	[690] **Use of Controlled Fractures in Enhanced Geothermal Systems** *Harun Rashid, Olufemi Olorode*

Oral presentations: Parallel sessions 1.3, cont.

17:00 - 18:00

MS09: Pore-scale modelling - *Part 3*

Lowther

Chairs: *Stephane Zaleski & Moran Wang*

17:00	[413] **Analysis of capillary pumping during the drying of heterogeneous porous media using Lattice Boltzmann modelling** *Linlin Fei, Dominique Derome, Jan Carmeliet*
17:15	[428] **Pore scale study of freeze-drying using a non-isothermal pore network model and X-ray tomography image data** *Simson Julian Rodrigues, Nicole Vorhauer-Huget, Maximilian Thomik, Sebastian Gruber, Petra Foerst, Evangelos Tsotsas*
17:30	[854] **Upscaling the rheology of non-Newtonian fluid flow in porous medium – a pore-scale study** *Amna Al-Qenae, Senyou An, Rouhi Farajzadeh, Vahid Niasar*
17:45	[521] **Pore-scale Ostwald ripening of residually trapped CO2 in the presence of oil and water at immiscible and near-miscible conditions** *Deepak Singh, Helmer Andrè Friis, Espen Jettestuen, Johan Olav Helland*

MS15: Machine Learning and Big Data in Porous Media - *Part 2*

Ochil

Chairs: *Hongkyu Yoon & Ziv Moreno*

17:00	[134] **Introducing Barlow Twins deep operator networks as a proxy for geologic carbon storage** *Teeratorn Kadeethum, Nikolaos Bouklas, Somdatta Goswami, George Karniadakis, Hongkyu Yoon,*
17:15	[337] **Microscopic flow parameters prediction of shale oil based on deep learning** *Liang Zhou, Hai Sun, Lei Zhang, Yongfei Yang, Jun Yao*
17:30	[110] **Simulating water flow and solute transport at unsaturated soils with unknown initial conditions using physics-informed neural networks trained with time-lapse geoelectrical measurements** *Ziv Moreno, Peleg Haruzi*
17:45	[560] **Estimating Storage Capacity of Sandstones from 3D Rock Images Using Convolutional Neural Networks: Implications for CO2 Geo-storage** *Ahmed Rizk, Amaar Siyal*

MONDAY, 22 MAY 2023

Exhibition Opening & Welcome Reception

Cromdale Hall 18:00 - 19 :30

Join us for a welcome reception and the official opening of the conference exhibition. Drinks and hors d'oeuvres will be provided. This is a great opportunity to socialize with your peers, visit the exhibitor booths, and kick-off the conference.

Tickets are included in the in-person registration and accompanying persons fees.

Plenary Session

Pentland Auditorium *8:30 - 9:20*
Chair: *Karsten Thompson*

Award Ceremony 2 *8:30 - 8:40*

InterPore Honorary Lifetime Membership Award

Dorthe Wildenschild
Oregon State University, USA

The Honorary Lifetime Membership Award is reserved for individuals who have made extraordinary contributions to porous media science and technology, who are world renowned in the porous media community, and whose contributions are consistent with the aims and ideals of InterPore.

Kimberly-Clark Distinguished Lectureship Award

Ruben Juanes
Massachusetts Institute of Technology, USA

Each year, InterPore selects a porous media researcher with an esteemed international recognition and excellent presentation skills, who works on a broad range of porous media topics, as the "InterPore Kimberly-Clark Distinguished Lecturer on Porous Media Science & Technology". The awardee will share a topic relevant to the industrial porous media community through a series of lectures at various member and non-member organizations.

Secure your chance to host Prof. Juanes at your institute: Visit the InterPore virtual booth for more information on how to apply.

A word of gratitude: This award has been made possible by a generous grant from Kimberly-Clark, home to some of the world's most iconic and trusted brands, including: Huggies, Scott, Kleenex, Cottonelle and Kotex. For more than a century Kimberly-Clark has been transforming insights and technologies into innovative products and services that improve the lives of nearly a quarter of the world's population.

TUESDAY, 23 MAY 2023

Plenary Session, cont.

Plenary Lecture *8:40 - 9:20*
Pentland Auditorium
Chair: *Roseanne Ford* (University of Virginia)

Eugene Vorobiev
Université de Technologie de Compiègne, *France*

Electroporation of cellular membranes for the enhancement of mass transfer in biological media: mechanism and technological applications

Cellular membranes serve as selective barriers for regulation of molecular transport between interior and exterior of cells. Under the effect of electric field pulses of very short duration (from several hundred of nanoseconds to several milliseconds) with pulse amplitude from 100-300 V/cm to 100-300 kV/cm, the biological membrane is electrically pierced and loses its semi-permeability temporarily or permanently. The electrical permeabilization of biological membranes (called electroporation) may be reversible or irreversible. It was shown that electroporation can serve to introduce into cells or extract from cells small and/or large molecules. This phenomenon has been applied to amplify the insertion of nucleic acid molecules in genetic modifications, to enhance drug transport in cancer treatment or for the killing of microorganisms. Electroporation can also be used to enhance extraction of valuable cell compounds (polyphenols, carbohydrates, proteins,..) from biological media (plant tissue and biomass materials). Biological tissue with electroporated cell membranes, but with a preserved cell wall network, is selectively permeable. For the purpose of mass transport, electroporated cell tissue presents a porous network with improved permeability and diffusivity characteristics.
This lecture presents the mechanisms of cell electroporation, its impact on the physical properties of biological media, and gives examples of mass transfer enhancement in electroporated cell network. Different methods to detect and quantify electroporation phenomena in porous network of biological tissue are presented. Impacts of electroporation on the mechanical, diffusional and electrophysical properties of biological media are illustrated by numerous examples. Physical models of liquid expression and compounds diffusion in compressible electroporated biological tissue are presented. Several innovative green technologies based on the pulsed electric energy induced electroporation are presented, including selective extraction, filtration, pressing, and drying of plant materials and biomass.

Oral presentations: Parallel sessions 2.1
9:30 - 10:30

MS01: Porous Media for a Green World: Energy & Climate - *Part 3*
Tinto
Chairs: *Maartje Boon & Anna Herring*

9:30	[201] **On the conceptual role of permeability contrasts within sandstone utilised for underground hydrogen storage** *Doug Smith, Andreas Busch, Dan Arnold*
9:45	[280] **Salinity gradients and salt precipitation due to hydrogen injection in saline aquifers and reservoirs** *Gulce Kalyoncu, Mostafa Borji, Zaid Jangda, Kamaljit Singh, Hannah Menke, Ben Callow, Shan Wang, Sharon Ellman, Veerle Cnudde, Hannelore Derluyn, Tom Bultreys*
10:00	[855] **Caprock sealing capacity for underground hydrogen storage; Kimmeridge Clay** *Lubica Slabon, Ian Molnar, Katriona Edlmann, Aliakbar Hassanpouryouzband, Jen Roberts*
10:15	[681] **Impact of hydrogen trapping in underground porous formations on recovery efficiencies during interseasonal storage injection and withdrawal cycles** *Katriona Edlmann, Aliakbar Hassanpouryouzband, Niklas Heinemann, Ian Butler, Eike Thaysen*

MS05: Biochemical processes and biofilms in porous media - *Part 2*
Carrick
Chairs: *Veronica Morales & Roseanne Ford*

9:30	[194] **Meter-scale MICP improvement of medium graded very gravelly sands: lab measurement, transport modeling, mechanical and microstructural analysis** *Guijie Sang, Rebecca Lunn, Grainne El Mountassir, James Minto*
9:45	[151] **Systematic screening of microbial induced calcite precipitation kinetics via online monitoring** *Frédéric Lapierre, Patrick Hanisch, Brigitte Nagy, Timo Schmidberger, Andrea Kustermann, Robert Huber*
10:00	[198] **Assessing the strength of biomineral strategies for concrete repairs.** *Athanasios Karampourniotis, Gloria Castro, Rebecca Lunn, Enrico Tubaldi, Grainne El Mountassir*
10:15	[858] **Influence of mineralogy on Sporosarcina pasteurii attachment in engineered and natural porous media** *Eva Albalghiti, Brian Ellis*

TUESDAY, 23 MAY 2023

Oral presentations: Parallel sessions 2.1, cont.

9:30 - 10:30

MS03: Flow, transport and mechanics in fractured porous media- *Part 4*

Lammermuir 1

Chairs: *Jeffrey Hyman & Hongkyu Yoon*

9:30	[894] **Bridging the gap between lab experiments and mixed-dimensional modeling for flow and transport in fractured media** *Jakub Both, Bergit Brattekås, Martin Ferno, Eirik Keilegavlen, Jan Martin Nordbotten*
9:45	[358] **An REV-scale model for dissolution of porous rocks** *Anthony Ladd, Liang Yu, Piotr Szymczak*
10:00	[375] **Exploring the limits of semi-analytical matrix diffusion** *Matthew Sweeney, Jeffrey Hyman, Konstantin Lipnikov, Aidan Stansberry, John David Moulton, Hari Viswanathan, Philip Stauffer*
10:15	[561] **About long time asymptotic solutions of non-linear counter current two-phase flow in rock matrix blocks** *Benoit Noetinger, Frédéric Douarche, Benjamin Braconnier, Sina Momeni*

MS08: Mixing, dispersion and reaction processes across scales in heterogeneous and fractured media - *Part 3*

Lammermuir 2

Chairs: *Branko Bijeljic & Mohammad Nooraiepour*

9:30	[323] **Sorption in heterogenous porous media: a numerical study of the effects of spatial heterogeneity of pore structure** *Mohaddeseh Mousavi Nezhad, Milad Hosseini*
9:45	[572] **Exploring the Impact of Heterogeneity and Flow Rate on Mixing and Displacement of Miscible Phases in Porous Media** *yaniv edery, Yahel Eliyahu-Yakir*
10:00	[637] **Intermittent shifting of preferential flow paths in bioclogged porous media enhances mixing-driven reactions** *Veronica Morales, Jiahui Zhou*
10:15	[137] **Dynamics of microplastic fiber mobility in a periodic porous media: Experimental results and numerical simulations** *Nick Engdahl, Tyler Fouty*

Oral presentations: Parallel sessions 2.1, cont.
9:30 - 10:30

MS06-B: Interfacial phenomena across scales - *Part 2*
Monteith
Chairs: *Eduardo Abreu, Ran Holzman & Nathaly Lopes Archilha*

9:30	[325] **The Influence of Viscosity and Wettability on Immiscible Fluid Displacements in Porous Media** *Harris Rabbani, Saideep Pavuluri, Ran Holtzman*
9:45	[694] **The Effect of Porous Medium Wettability on the Relationship Between Capillary Pressure, Saturation, and Interfacial Area for Three-Phase Flow** *Dorthe Wildenschild, Rebecca Paustian*
10:00	[839] **Systematic study of wettability alteration of glass surfaces by dichlorooctamethyltetrasiloxane silanization; a guide for contact angle modification** *Tomislav Vukovic, Jostein Røstad, Umer Farooq, Ole TORSAETER, Antje van der Net*

MS21: Non-linear effects in flow and transport through porous media - *Part 2*
Harris
Chairs: *Mohaddeseh Mousavi-Nezhad & Alberto Guadagnini*

9:30	[125] **Numerical Challenges in Numerical of Foam Displacements in Porous Media** *William Rossen, Denis Voskov, Xiaocong Lyu, JIAKUN GONG, Guanqun Yu*
9:45	[374] **A linearised closure approach for averaged inertial and compressible flows** *Yanis Bendali, Morgan Chabanon, Benoit Goyeau, Quentin Holka, Ephraïm Toubiana*
10:00	[33] **Immersion of porous aggregates: application to concrete recycled aggregates** *Emmanuel Keita, Florian Théréné, Jennifer Naël-Redolfi, Pascal Boustingorry, Nicolas Roussel*
10:15	[877] **Measuring the changes in the pore size distribution of a soil sample during its compression using non-Newtonian fluids.** *Martin Lanzendörfer, Soheil Safari Anarkouli, Martin Slavík, Tomáš Weiss, Jan Najser, Jakub Roháč*

TUESDAY, 23 MAY 2023

Oral presentations: Parallel sessions 2.1, cont.

9:30 - 10:30

MS09: Pore-scale modelling - *Part 4*

Lowther

Chairs: *Ke Xu & Leila Hashemi*

9:30	[550] **Wettability effect on flow-driven deformation using hydro-mechanically coupled pore network model** *Min-Kyung Jeon, Tae-Hyuk Kwon, Lee Joo Yong*
9:45	[556] **Representation of Fully Three-Dimensional Interfacial Curvature in Pore-Network Models** *Luke Giudici, Ali Qaseminejad Raeini, Martin Blunt, Branko Bijeljic*
10:00	[174] **A numerical study of CO2-CH4 displacement in shale using Lattice Boltzmann method** *Jian Wu, Luming Shen, Yixiang Gan, Zhang Shi, Pengyu Huang*
10:15	[643] **Finding the Representative Elementary Volume with Hill-Mandel condition** *Sijmen Zwarts, Martin Lesueur*

MS15: Machine Learning and Big Data in Porous Media - *Part 3*

Ochil

Chairs: *Ciprian Panaitescu & Kunning Tang*

9:30	[283] **Practical Tera-scale 3D Super Resolution Approaching a 1-micron Resolved 1-inch Core Plug** *Ying Da Wang, Kunning Tang, Ryan Armstrong, Peyman Mostaghimi*
9:45	[384] **Multiscale Rock Image Pore Structure Feature Identification, Quantification and Modelling using AI** *Ciprian Panaitescu, Kejian Wu, Yukie Tanino, ANDREW STARKEY*
10:00	[542] **Pseudo 3D unpaired domain transfer network for digital rock domain adaptation** *Kunning Tang, Ying Da Wang, Peyman Mostaghimi, Ryan Armstrong*
10:15	[668] **CNN model for multi-component digital rock modeling based on CT and QEMSCAN images** *Xueqing Zhou, Linqi Zhu*

DO YOU KNOW....EDINBURGH?

Hogmanay

In Scotland, New Year's Eve is called Hogmanay and the celebration has its origins in the wild Viking celebrations of the winter solstice. Hogmanay in Edinburgh is a unique event, celebrated with a street party, including a torchlight procession, a ceilidh (traditional Scottish music and dancing) and a spectacular firework display over the castle. If that isn't enough, you can welcome in the new year with the Loony Dook, a bracing morning dunk in the river.

"Edinburgh Hogmanay 2010" by yellow book is licensed under CC BY 2.0. To view a copy of this license, visit https://creativecommons.org/licenses/by/2.0/?

Coffee Break & Exhibition

Cromdale Hall 10:30 - 12:00

Refreshments are available in the poster and exhibition hall. Come grab a snack, network with other attendees, visit the exhibition booths and discuss the posters on display.

Poster Session I

Cromdale Hall 10:30 - 12:00

Poster board	
1	[315] **Effects of microplastics on temperature profiles inside porous media during evaporation** *Milad Aminzadeh, Tanmay Kokate, Nima Shokri*
2	[317] **NMR Study of water transfer from bio-based materials to the living plant** *Rahima SIDI-BOULENOUAR, Benjamin Maillet, Philippe Coussot*
3	[342] **Influence of phototrophic biofilms on nutrient availability in soil** *Jonas Kollmen, Katharina Wastian, Dorina Strieth*
4	[437] **Further Analysis of the Flow through Porous Bodies with Application to Stormwater Management** *Ana Barcot, Sofia Larsson, Hans Åkerstedt, Staffan Lundström*
5	[448] **NMR relaxometry characterization of water adsorption in corn stover anatomical fractions** *Matthew Young, Sarah Codd, Dylan S. Cousins, William G. Otto, David B. Hodge, Joseph Seymour*
6	[2] **Permeability evolution of fractured sorptive porous materials** *Yida Zhang*
7	[6] **Quantitative characterization of pore structure and analysis of seepage characteristics of tight reservoir based on digital core and NMR** *Meng Du, zhengming yang, weifeng lv, Xinliang Chen, Wen Li*

TUESDAY, 23 MAY 2023

Poster Session I, cont.

Cromdale Hall 10:30 - 12:00

Poster board	
8	[39] **Numerical simulation of hydraulic stimulation on geothermal reservoirs: injection optimization to manage induced seismicity and thermal decline** *Sandro Andrés Martínez, David Santillan Sanchez, Juan Carlos Mosquera Feijoo, Luis Cueto-Felgueroso*
9	[494] **Inelastic deformation of porous sandstones and its influence on rock properties under cyclic triaxial loading conditions** *Ming Wen, Andreas Busch, Nick Harpers, Kamaljit Singh, Jim Buckman*
10	[543] **Electrokinetic in situ recovery of copper: The influence of mineral occurrence, zeta potential, and electric potential** *Kunning Tang, Zhe Li, Ying Da Wang, James McClure, Peyman Mostaghimi, Ryan Armstrong*
11	[1043] **Study on the Law of CO2 Miscible Displacement Under Different Injection Methods in Heterogeneous Reservoir** *Xinliang Chen, Yu Hongwei, zhengming yang, Wen Li, Meng Du, Zhongkun Niu, yilin chang*
12	[1045] **A visualization study of stress evolution in CBM horizontal well cavity completion** *Xiaozhou Qin, Ruiyue Yang, Zhongwei Huang, Jianxiang Chen, Meiyang Jing, Jiawen Li*
13	[1046] **Experimental Study on Stress Sensitivity Considering Different Fractures and Water Content in Shale Reservoir** *Jin Chang, Zhiming Hu, Xianggang Duan, Yuanyuan Li, Ke Xu*
14	[1051] **Sound and x-ray vision of a porous rock: micromechanics of shear failure under different loading protocols and implications for managing induced seismicity during subsurface operations** *Alexis Cartwright-Taylor, Maria-Daphne Mangriotis, Ian G. Main, Ian Butler, Florian Fusseis, Andrew Curtis*
15	[7] **Investigation of reaction rates during microbiologically induced calcium carbonate precipitation** *Niklas Erdmann, Susanne Schaefer, Ulrich Bröckel, Dorina Strieth*

Poster Session I, cont.

Cromdale Hall 10:30 - 12:00

Poster board	
16	[29] **An innovative method for the utilization of quarry sand** *Dorina Strieth, Niklas Erdmann, Susanne Schaefer, Eva Hagen, Ulrich Bröckel*
17	[120] **Particle methods for the dynamics of porous biofilms with heterogeneous rheology and its interaction with human lung epithelium** *Jean-Matthieu Etancelin, Marlène Murris-Espin, Philippe Poncet*
18	[161] **Novel laboratory apparatus for understanding microbiology in hydrogen storage in porous media** *Simon Gregory, Jessica Mackie, Megan Barnett*
19	[197] **Colloid transport inside slow sand filters: A multi scale study** *Mandana Samari Kermani, Amir Raoof, Jack Schijven*
20	[77] **Spatial moment analysis of single-species transport in unidirectional laboratory tracer tests using rock cores** *Amarjot Singh Bhullar, Riccardo Standish, Ronny Pini*
21	[158] **Enhanced fluid-fluid chemical reaction kinetics under dynamic multiphase flow** *Xueyi Zhang, Zhi Dou, Joaquin Jimenez-Martinez*
22	[169] **A Correlation for Dispersion Coefficient in Pipe Flows** *Yang Liu, Gong Wenbo, Moran Wang*
23	[1068] **Transport in heterogeneously reactive media** *Dario Maggiolo, Oskar Modin, Angela Sasic Kalagasidis*
24	[15] **Atomistic Insight into Trapped Oil Displacement by Nanofluids** *yuanhao chang, Zhiliang Zhang, SENBO XIAO, JIANYING HE*
25	[184] **Wetting and Drying Dynamics in Hierarchically Porous Silicon: An In-Situ X-Ray Microscopy Study** *Stella Gries, Laura Gallardo, Mark Busch, Mariia Liseanskaia, Juan Sanchez, Mathis Boderius, Silja Flenner, Imke Greving, Patrick Huber*

TUESDAY, 23 MAY 2023

Poster Session I, cont.

Cromdale Hall 10:30 - 12:00

Poster board	
26	[359] **Reactive transport modeling in aqueous environments using the Nernst–Planck formulation** *Po-Wei Huang, Bernd Flemisch, Chaozhong Qin, Martin Saar, Anozie Ebigbo*
27	[263] **DoE-based history matching for probabilistic integrity analysis -- a case study of the FE-experiment at Mt. Terri** *Jörg Buchwald, Sonja Kaiser, Wenqing Wang, Olaf Kolditz, Thomas Nagel*
28	[273] **Acceleration of Optimal Bayesian Experimental Design via Decision Trees Methods with Orthgonality Constraint** *Alexander Tarakanov, Grigorii Buklei*
29	[90] **Adaptive node adjustment for real-time subsurface flow modeling** *Shang-Ying Chen, Kuo-Chin Hsu*
30	[140] **Enhancing a high-fidelity nonlinear solver with reduced order model for induced seismicity** *Teeratorn Kadeethum, Kyung Won Chang, Austin A. Holland, Hongkyu Yoon*
31	[167] **Semantic segmentation of rock images from multiple imaging methods using deep learning methods** *Robert John Ringer, Hongkyu Yoon*
32	[659] **Deep Learning-based inverse modeling of a tank model of a channelized aquifer** *VANESSA A. GODOY, Valeria Todaro, Gian Napa, Andrea Zanini, J. Jaime Gómez-Hernández*
33	[1076] **DeepAngle: Deep-learning-based estimation of the contact angle distribution in tomography images of porous media** *Arash Rabbani, Masoud Babaei, Peyman Mostaghimi, Ryan Armstrong, Vahid Niasar, Chenhao Sun*

Poster Session I, cont.

Cromdale Hall 10:30 - 12:00

Poster board	
34	[96] **A Fourier-transform approach for fringe pattern analysis for a Mach-Zehnder interferometry measurement on surface evaporation of saturated porous media** *Julian Härter, Christoph Steinhausen, Rico Poser, Grazia Lamanna, Bernhard Weigand*
35	[282] **Enhancing backfill thermal properties by combining granular phase change materials, graphite and glass** *Tairu Chen, Wenbin Fei, Guillermo A. Narsilio*
36	[503] **Modeling Structural Changes in a Fixed Bed Reactor for Thermochemical Heat Storage During Continuous Cycling** *Torben Prill, Marie Gollsch, Marc Linder, Thomas Jahnke*
37	[539] **Simulation Study on Heat Flow Coupled Heat Transfer in Porous Media** *Minhua Cheng*
38	[1084] **CAN SINGLE POROSITY MODELS ADEQUATELY REPRESENT HEAT FLOW IN FRACTURED POROUS MEDIA?** *David Egya, Daniel Arnold, Sebastian Geiger*
39	[136] **ASSESSMENT OF THE ACCURACY OF THE SOIL GAS RADON DEFICIT TECHNIQUE FOR MONITORING AND QUANTIFYING RESIDUAL LNAPL CONTAMINATION** *Alessandra Cecconi, Iason Verginelli, Renato Baciocchi*
40	[284] **Stability assessment of foam enhanced by surfactant, polymer and nanoparticles in the presence of petroleum hydrocarbons** *Adil Baigadilov, Stéfan Colombano, Sagyn Omirbekov, Hossein Davarzani, Fabien Lion, Laurent Oxarango, Hugues Bodiguel*
41	[397] **Inhibiting transport of radionuclides in porous media by combining in situ electrokinetics with colloidal silica grout** *Rebecca Lunn, Arianna Pagano, Grainne El Mountassir, Andrew Cundy, Frances Burrell*

TUESDAY, 23 MAY 2023

Poster Session I, cont.

Cromdale Hall 10:30 - 12:00

Poster board	
42	[575] **Understanding the Reactive Transport and Retention Behavior of Engineered Virus-mimicking Nanostructures** *Jai Kishan Rajak, Jan Foppen, Sulalit Bandyopadhyay*
43	[177] **Investigating mass transfer relationships in stereolithography 3D printed electrodes for redox flow batteries** *Maxime van der Heijden, Marit Kroese, Zandrie Borneman, Antoni Forner-Cuenca*
44	[199] **Expression of Eshelby tensor from fabric tensor** *Young June Yoon*
45	[418] **Flow of a fluid with pressure-dependent viscosity through aging porous media** *Shriram Srinivasan*
46	[567] **Mechanistic studies on the adsorption of Iodinated Contrast Media agents on Activated Carbon** *Ashfeen Ubaid Khan, Alberto Guadagnini, Monica Riva, Giovanni Porta*
47	[1070] **PTFE-based pore-filled ion exchange membranes for electrodialysis and energy conversion processes** *Jeong-Hoon Kim, Bo-ryung Park*

TUESDAY, 23 MAY 2023

Oral presentations: Parallel sessions 2.2

12:00 - 13:00

MS01: Porous Media for a Green World: Energy & Climate - *Part 4*

Tinto

Chairs: *William Rossen & Maartje Boon*

12:00	[30] **The Impact of Capillary Heterogeneity on CO2 Plume Migration at the Endurance CCS Target Site in the UK – A Core To Field Scale Study** *Nele Wenck, Samuel Jackson, Ann Muggeridge, Sam Krevor*
12:15	[67] **Experimental study of the sealing properties of cement plug during the early age** *Nils Opedal, Even Wiggen, Elie Ngouamba, Ragnhild Skorpa*
12:30	[78] **Mineral Dissolution on Geological Carbon Storage in Carbonates: A Microcalorimetric Study** *Jacquelin Cobos, Erik Søgaard, Bergit Brattekås*
12:45	[23] **On the modelling of Joule-Thomson Effects: Analytical and Numerical Formulations** *Cintia Goncalves Machado, Paul Egberts, Negar Khoshnevis Gargar*

MS03: Flow, transport and mechanics in fractured porous media - *Part 5*

Lammermuir 1

Chairs: *Jeffrey Hyman & Holger Steeb*

12:00	[540] **Intermediate-scale experimental study and modeling of effects of caprock fracturing on brine contamination of shallow aquifers during storage of CO2 in deep saline geologic formations** *Tissa Illangasekare, Jakub Solovisky, Holly Moser, Ahamed Askar, Radek Fučík*
12:15	[641] **Multiscale modelling of CO2 storage in coal seams: an image-based modelling method** *YU JING, Arash Rabbani, Peyman Mostaghimi, Ryan Armstrong*
12:30	[498] **Impact of matrix diffusion on heat transport through heterogeneous fractured aquifers** *Silvia De Simone, Olivier Bour, Philippe Davy*
12:45	[87] **A wave-mediated effective diffusion model for gas production from a semi-sealed system** *Yan Jin, Shiming Wei, Kangping Chen*

Oral presentations: Parallel sessions 2.2, cont.
12:00 - 13:00

MS08: Mixing, dispersion and reaction processes across scales in heterogeneous and fractured media - *Part 4*
Lammermuir 2
Chairs: *Branko Bijeljic & Marco Dentz*

12:00	[691] **Dispersive transport dynamics in porous media emerge from local correlations** *Lucas Goehring, Felix Meigel, Thomas Darwent, Leonie Bastin, Karen Alim*
12:15	[951] **Quantification of Coupled Longitudinal and Transverse Dispersion in Porous Media** *Lesley James, Saied Eskandari*
12:30	[709] **Computing Fick diffusion coefficients using equilibrium molecular dynamics for binary mixtures of hydrogen relevant for underground hydrogen storage** *Thejas Hulikal Chakrapani, Hadi Hajibeygi, Thijs. Vlugt, Othonas Moultos*
12:45	[747] **Surface Induced Anomalous Transport of Nanoparticle in 3D Printed Structurally Heterogeneous Soils: coupling experiments and stochastic models** *Filippo Miele, Janis Patino, Veronica Morales*

MS06-A: Physics of multiphase flow in diverse porous media - *Part 3*
Monteith
Chairs: *Yu Jing & Saman Aryana*

12:00	[24] **Rheology and Mobility Critical Exponent of Immiscible Two-Phase Flow in Porous Media with Dual-Wettability Grains** *Hursanay Fyhn, Santanu Sinha, Alex Hansen*
12:15	[392] **Micromodel of a gas diffusion electrode tracks in-operando pore-scale wetting phenomena** *Anna Kalde, Maren Grosseheide, Sebastian Brosch, Sharon Pape, Robert Keller, John Linkhorst, Matthias Wessling*
12:30	[123] **New insights into the mechanisms leading to the formation of localised pathways in water-saturated clayey geomaterials exposed to pressurised non-wetting fluid emulating supercritical CO2** *Craig Allsop, Matteo Pedrotti, Alessandro Tarantino*
12:45	[901] **Characteristics of fluid-fluid displacement in model mixed-wet porous media** *Ashkan Irannezhad, Bauyrzhan Primkulov, Ruben Juanes, Benzhong Zhao*

TUESDAY, 23 MAY 2023

Oral presentations: Parallel sessions 2.2, cont.

12:00 - 13:00

MS19: Elastic, electrical, and electrochemical processes and properties in porous media - *Part 1*

Harris

Chairs: *Pablo Angel Garcia-Salaberri & Pranay Shrestha*

12:00	[477] **TRANSPORT AND ENERGY CONVERSION IN NON-ISOTHERMAL BATTERY SYSTEMS. THE CASE OF THE LITHIUM BATTERY** *Øystein Gullbrekken, Astrid Fagertun Gunnarshaug, Signe Kjelstrup, Anders Lervik, Sondre Schnell*
12:15	[634] **Electro-diffusion through montmorillonite gels** *Fatiha Bouchelaghem*
12:30	[744] **Modeling quasi-steady-state phase change transport in polymer electrolyte membrane fuel cells: Effect of surface crack density** *Pablo Angel Garcia-Salaberri*
12:45	[803] **Revealing multi-component 4-D heterogeneity in electrochemical systems via simultaneous neutron and X-ray tomography** *Pranay Shrestha, Jacob M. LaManna, Kieran F. Fahy, Pascal Kim, ChungHyuk Lee, Jason K. Lee, Elias Baltic, Daniel S. Hussey, David L. Jacobson, Aimy Bazylak*

MS09: Pore-scale modelling - *Part 5*

Lowther

Chairs: *Moran Wang & Leila Hashemi*

12:00	[664] **Improved Amott Experiments Capture Dynamics of Spontaneous Imbibition into Mixed-Wet Carbonate-Rock with Non-Zero Initial Brine Saturation** *Ksenia Kaprielova, Maxim Yutkin, Ahmed Gmira, Subhash Ayirala, Ali A. Yousef, Clayton Radke, Tadeusz Patzek*
12:15	[713] **Steady-state flow transitions in ordered porous media investigated using an artificial compressibility finite difference method** *Tobias Forslund, Staffan Lundström, Sofia Larsson, Gunnar Hellström*
12:30	[756] **Analysis of CO2 trapping potential by combining morphology-based digital rock simulations and pore-scale flooding experiments** *Bianca Brandstätter, Pit Arnold, Holger Ott, Rene Ritter, Lobel Danicic*
12:45	[41] **Geometrical analysis of the pore space through the A* algorithm: application to 3D micro-CT images** *Filippo Panini, Eloisa Salina Borello, Dario Viberti*

Oral presentations: Parallel sessions 2.2, cont.

12:00 - 13:00

MS15: Machine Learning and Big Data in Porous Media - *Part 4*

Ochil

Chairs: *Christoph Arns & Agnese Marcato*

12:00	[211] **An Improved Pore-scale Rock-typing Method using Minkowski maps for the Sensitivity of Regional Support Size** *Han Jiang, Chaozhong Qin, Christoph Arns*
12:15	[804] **Modeling time-dependent battery discharge rate using an autoregressive multiscale neural network** *Agnese Marcato, Gianluca Boccardo, Javier E. Santos, Alejandro Franco, Daniele Marchisio, Chaoyue Liu*
12:30	[817] **Imaging upscaling study for porosity and permeability characterization in carbonate rock using machine learning** *Wen Pin Yong, Hannah Menke, Julien Maes, Helen Lewis, Jim Buckman, Sebastian Geiger, Zainol Affendi Abu Bakar, Kamaljit Singh*
12:45	[841] **Application of Machine Learning to Generate Multiphase Pore-Scale Images** *Linqi Zhu, Branko Bijeljic, Martin Blunt*

TUESDAY, 23 MAY 2023

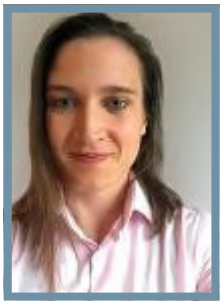
SAC Career Development Event

Lennox Suite *12:00 - 13:00*

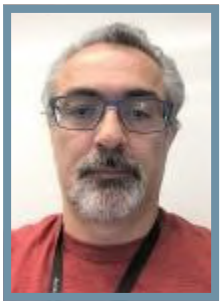
Join us at InterPore2023's Career Development Event, where the Students Affairs Committee (SAC) will host a panel of established professionals who will share their personal and expert insights on navigating different career paths in the porous media science field. As a student or a Ph.D. candidate, deciding which career path to follow can be difficult after graduation. By attending this event, gain valuable guidance and perspectives on the accessible career options in this rapidly evolving era of energy transition and green shift. Discover the pros and cons of pursuing an academic career or exploring possibilities in industry or governmental agencies, and learn how to find satisfying and secure employment after graduation. Our speakers will share critical choices they made along their career paths and offer their perspectives on the future of young porous media scientists.

This event is free and open to all participants of InterPore2023!

Majid Hassanizadeh
Utrecht University, *The Netherlands*



Hannah Menke
Heriot-Watt University, *UK*



Bamshad Nazarian
Equinor, *Norway*

Rebecca Liyanage
Pexapark, *UK*

Lunch Break

13:00 - 14:15

See “Area Restaurants” in the Logistics menu on the Whova app for information on restaurants near the EICC.

Oral presentations: Parallel sessions 2.3
14:15 - 15:30

MS01: Porous Media for a Green World: Energy & Climate - *Part 5*

Tinto

Chairs: *Kai Li & Brian Ellis*

14:15	[938] **Experimental investigation of CO2 dissolution in Ca2+ rich aquifer with precipitation reaction** *Shuai Zheng, Ke Xu*
14:30	[385] **Management of salt precipitation for large-scale CO2 storage projects** *Sarah Gasda, David Landa Marbán, Nematollah Zamani*
14:45	[547] **Sensitivity Analysis of CO2 Mineralization Trapping during CO2 Sequestration** *Ayomikun Bello, Anastasia Ivanova, Alexey Cheremisin*
15:00	[269] **Gas trapping dynamics in heterogeneous sandstones imaged using synchrotron time-lapse tomography.** *Catrin Harris, Senyou An, Vincenzo Cunsolo, Samuel Jackson, Ann Muggeridge, Sam Krevor*
15:15	[147] **3D X-Ray Visualization of Rayleigh-Bénard Instability in a Porous Medium** *Sotheavuth SIN, Shun Imai, Shintaro Matsushita, Tetsuya Suekane*

TUESDAY, 23 MAY 2023

Oral presentations: Parallel sessions 2.3, cont.

14:15 - 15:30

MS05: Biochemical processes and biofilms in porous media - *Part 3*

Carrick

Chairs: *Eleonora Secchi & Roseanne Ford*

14:15	[34] **Impact of the internal heterogeneity of biofilms on hydrodynamics and reactions in 3D porous media** *Ishaan Markale, Maxence Carrel, Dorothee Luise Kurz, Veronica Morales, Markus Holzner, Joaquin Jimenez-Martinez*
14:30	[112] **Study of Biofilm Structure using Advanced Imaging Techniques and Extraction of Pore Network from Simulated Biofilms** *Emad Aamer, Katja Bettenbrock, Robert Dürr, Lars Beyer, Achim Kienle, Nicole Vorhauer-Huget*
14:45	[195] **In situ imaging of bacteria transport and attachment in geologic materials using positron emission tomography** *Christopher Zahasky, Vy Le*
15:00	[678] **Pore-scale modelling of Microbially Enhanced Carbon Mineralization** *michele starnoni, Xavier Sanchez-Vila*
15:15	[757] **Biofilm growth in heterogeneous porous media: pore-scale modeling and anomalous transport analysis** *Xueying Li, Xiaofan Yang, yurong yang*

Oral presentations: Parallel sessions 2.3, cont.

14:15 - 15:30

MS03: Flow, transport and mechanics in fractured porous media- *Part 6*

Lammermuir 1

Chairs: *Jeffrey Hyman & Hamid Nick*

14:15	[497] **Physical models for fracture flow tests by 3D-scanning and -printing** *Michael Kröhn, Klaus-Peter Kröhn*
14:30	[476] **A 3D Integrated Model of Porous Media and Fractured Rock for Interpretation of Subsurface DNAPLs Migration** *Taehoon Kim, Weon Shik Han, Seonkyoo Yoon, Peter Kang, Jehyun Shin*
14:45	[597] **Groundwater Model Development of a Fractured Crystalline Rock Site with Site-Specific Data** *Stefano Normani, Andrew Snowdon, Eric Sykes, Aaron DesRoches, Andrew Parmenter, Jonathan Sykes*
15:00	[884] **Condensation of vapor in a cracked sandstone revealed by in-situ rapid neutron tomography** *Arash NEMATI, Bratislav Lukić, Alessandro Tengattini, Ritesh GUPTA, Matthieu Briffaut, Philippe Séchet*
15:15	[849] **Particle deposition and clogging over rough natural fractures with surface attachments** *Bin Wang, Qianqian Zhou, Haizhu Wang, Sergey Stanchits, Yong Zheng, Alexey Cheremisin*

TUESDAY, 23 MAY 2023

Oral presentations: Parallel sessions 2.3, cont.

14:15 - 15:30

MS08: Mixing, dispersion and reaction processes across scales in heterogeneous and fractured media - *Part 5*

Lammermuir 2

Chairs: *Marco Dentz & Mohammad Nooraiepour*

14:15	[758] **Effect of radial advection on chemical fronts** *Anne De Wit, Alessandro Comolli, Luka Negrojevic, Fabian Brau*
14:30	[827] **Pulsed Flow Injection Strategies for Enhancing Subsurface Mixing** *James Minto, Gloria Castro, Jen Roberts*
14:45	[271] **Mixing in Porous Media: Observations and Modeling of the Local Concentration PDF** *Guillem Sole-Mari, Saif Farhat, Joris Heyman, Diogo Bolster, Daniel Hallack, Tanguy Le Borgne*
15:00	[462] **10 years of chaotic mixing in porous media** *Joris Heyman, Tanguy Le Borgne, Daniel Lester*
15:15	[487] **High Resolution Mixing and Reactions in a Porous Column** *Saif Farhat, Daniel Hallack, Guillem Sole Mari, Diogo Bolster*

Oral presentations: Parallel sessions 2.3, cont.

14:15 - 15:30

MS06-A: Physics of multiphase flow in diverse porous media - *Part 4*

Monteith

Chairs: *Yaniv Edery & Mohamad Masoudi*

14:15	[160] **Investigation of factors affecting the performance of surfactant and polymer floods in sandstone cores aided by X-ray CT imaging** *Andrea Rovelli, Ronny Pini*
14:30	[343] **ET-MIP: A coupled model approach to simulating the fate and transport of CO2 in overburden** *Nicholas Ashmore, Ian Molnar, Stuart Gilfillan, Magdalena Krol*
14:45	[644] **An Experimental Study of Drying in Porous Media Using Novel 2D Micromodels with Dual Porosity** *Md Ahsan Habib, Diego Armstrong, Bo Guo, Yaofa Li*
15:00	[213] **Simulation of CO2-Brine Primary Displacement in heterogeneous carbonate rocks** *Omidreza Amrollahinasab, Boris Jammernegg, Siroos Azizmohammadi, Holger Ott*
15:15	[611] **Characterisation of multiphase flow in heterogeneous rocks** *Senyou An, Sojwal Manoorkar, Nele Wenck, Steffen Berg, Conxita Taberner, Ronny Pini, Sam Krevor*

TUESDAY, 23 MAY 2023

Oral presentations: Parallel sessions 2.3, cont.

14:15 - 15:30

MS19: Elastic, electrical, and electrochemical processes and properties in porous media - *Part 2*

Harris

Chairs: *Pablo Angel Garcia-Salaberri & Pranay Shrestha*

14:15	[416] **Reflection and Transmission Coefficients at the Interface of Fluid-Saturated Porous Media** *Fabien Borocin*
14:30	[525] **AN EFFICIENT TIME DOMAIN IMAGE-BASED FINITE ELEMENT IMPLEMENTATION TO SIMULATE WAVE PROPAGATION IN POROUS MEDIA** *Victor Wriedt Sapucaia, André Pereira, Ricardo Leiderman*
14:45	[651] **A domain decomposition strategy to compute effective electrical conductivity of large-scale 3-D digital rock images.** *Rafael da Silva Vianna, Ricardo Leiderman, André Maués Brabo Pereira*
15:00	[734] **Young's modulus evolution during sintering of ceramics with and without shrinkage** *Willi Pabst, Eva Gregorová, Petra Šimonová, Tereza Uhlířová*

Oral presentations: Parallel sessions 2.3, cont.

14:15 - 15:30

MS11: Microfluidics and nanofluidics in porous systems - *Part 1*

Lowther

Chairs: *Cyprien Soulaine & Sophie Roman*

14:15	[28] **Insights into pore-scale hydrate morphologies during formation and dissociation in microfluidic for CH4 hydrate exploitation** *Qian Ouyang, Jyoti Shanker Pandey, Nicolas von Solms*
14:30	[79] **Nanofluidics: a window into pore-scale fundamentals of CO2 injection in shale** *Junjie Zhong*
14:45	[274] **Experimental observation of microbial growth using a microfluidics approach** *Christian Truitt Lüddeke, Birger Hagemann, Leonhard Ganzer, Gion Joel Strobel*
15:00	[316] **A lab on a chip concept for rationalizing hydro-geochemical processes at the pore scale** *Jenna Poonoosamy, Nikolaos Prasianakis, Enzo Curti, Abdulmonem Obeid, Guido Deissmann, Dirk Bosbach*
15:15	[1057] **Measurement of surface charge at immiscible liquid-liquid interface using streaming-potential-on-microfluidics** *Yunfan Huang, AMER ALIZADEH, Fanli Liu, Moran Wang*

TUESDAY, 23 MAY 2023

Oral presentations: Parallel sessions 2.3, cont.

14:15 - 15:30

MS10: Advances in imaging porous media: techniques, software and case studies - *Part 1*

Ochil

Chairs: *Liwei Zhang & Lin Ma*

14:15	[49] **Investigating the Use of Electrical Capacitance Tomography to Image Rapid Transient Moisture Flow Through Cracks in Concrete** *Laura Dalton, Mikko Räsänen, Antti Voss, Aku Seppänen, Mohammad Pour-Ghaz*
14:30	[193] **Development of a tridimensional characterization methodology for hierarchical materials: application to the nuclear effluent decontamination in fixed-bed processes.** *Samuel Vannier, Agnès GRANDJEAN, Alban GOSSARD, Thomas DAVID, Vanessa PROUST*
14:45	[430] **3D X-ray micro-velocimetry of unsteady multiphase flows in porous media** *Tom Bultreys, Sharon Ellman, Christian Matthias Schlepuetz, Matthieu Boone, Mostafa Borji, Gulce Kalyoncu, Niloofar Moazami Goudarzi, Shan Wang, Wannes Goethals, Stefanie Van Offenwert, Veerle Cnudde*
15:00	[433] **3D Pore Roughness Extraction Technique: From 1.0 (2D) to 2.0 (3D)** *Yiteng Li, Xupeng He, Zhen Zhang, Marwa AlSinan, hyung kwak, Hussein Hoteit*
15:15	[670] **Zoom-tomography applied to diverse porous media research at the MOGNO beamline from Sirius synchrotron** *Nathaly Lopes Archilha, Talita Rosas Ferreira, Victor R. M. Zelaya, Daphne Silva Pino, Bruno B. Kerber, Murilo Carvalho, Paola Cunha Ferraz, Larissa Macul Moreno, Otávio Moreira Paiano, Eduardo Xavier Miqueles*

DO YOU KNOW....EDINBURGH?

Royal Mile

Edinburgh's Royal Mile is the heart of Scotland's historic capital. Running through the city's medieval Old Town, the Royal Mile connects the magnificent Edinburgh Castle, perched high on a base of volcanic rock, with the stunning Palace of Holyrood, resting in the shadow of Arthur's Seat. The Royal Mile is overlooked by impressive, towering tenements, between which cobbled closes and narrow stairways interlock to create a secret underground world. Peppered with superb attractions such as the Real Mary King's Close, St Gile's Cathedral and the Scottish Storytelling Centre, historic sites including the ultra-modern Scottish Parliament and some of the best eating and drinking spots in the city, the Royal Mile offers much to see and do.

Invited Parallel Lecture 3

Pentland Auditorium *15:35 - 16:10*

Chair: *Veronica Morales* (University of California, Davis)

GeoDict - The Digital Material Laboratory

15:35 - 15:40

Bruce Balcom *15:40 - 16:10*

University of New Brunswick, *Canada*

Magnetic Resonance Measurements of Fluids in Shale

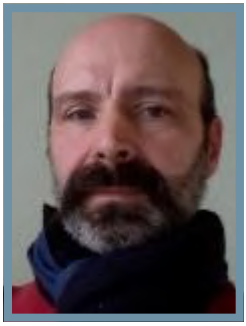
Shale formations are of increasing importance world-wide as petroleum reservoirs. Conventional core analysis measurements are ill suited to the analysis of shale samples since the pore fluids present are very difficult to extract due to the very small pore sizes. Magnetic Resonance (MR) permits non-invasive analysis of intact samples and is therefore an intuitively appealing method for shale analysis. The MR relaxation correlation measurement T1-T2 is now commonly employed for analysis of shale fluids. The T1-T2 measurement struggles to observe and quantify the fast decaying signal from pore fluids in shales. A new method, which we term T1-T2* captures the very short-lived fluid shale MR signal exceptionally well and provides well resolved discrimination and quantification of pore fluids, as well as the solid-like kerogen. In this lecture we will review MR relaxation time measurements of fluids in porous media, consider the broad category of MR relaxation correlation measurements ultimately leading to T1-T2* analysis of shales.

Invited Parallel Lecture 4

Moorfoot/Kilsyth *15:35 - 16:10*

Chair: *Willi Pabst* (University of Chemistry and Technology, Prague)

Breakthrough: CO2 on zeolites studies *15:35 - 15:40*



Gerard Vignoles *15:40 - 16:10*

University of Bordeaux, *France*

How the Chemical Vapor Infiltration process can be optimized for the production of advanced composite and porous ceramics

Chemical Vapor Infiltration (CVI) is a high-quality and versatile process enabling the preparation of reinforced porous and architecture ceramics as well as Ceramic Matrix Composites (CMC), which are high-temperature materials for aerospace, energy management and industrial systems. Very strong market growth perspectives trigger renewed interest in this process. However, being expensive and/or somewhat difficult to control and optimize, it needs modelling actions at least to provide guidelines for industrial usage.

This presentation will describe the process physico-chemistry and its modelling, which has to be multi-physics and multi-scale. The numerical tools range from simple analytical approximate formulae to detailed, image-based modelling of heat & mass transfer coupled to chemical reactions and featuring porous media with morphological evolution. Special attention is paid to (i) the relationship between fibrous media structure and transport properties, including rarefied gas transfer mode, (ii) the potential of using thermal gradients in order to optimise CVI and obtain a fast and efficient infiltration.

Coffee Break & Exhibition

Cromdale Hall 16:10 - 17:40

Coffee, beer & soft drinks are available in the poster and exhibition hall. Come grab a snack, network with other attendees, visit the exhibition booths and discuss the posters on display.

Poster Session II

Cromdale Hall 16:10 - 17:40

Poster board	
48	[588] **Influence of Pyrolysis Residence Time on The Physicochemical Properties of Algal Biochar for Water Treatment** *Esther Odiki, Tannaz Pak*
49	[601] **Pore-scale simulation of mucilage drainage using phase field method.** *Omid Esmaeelipoor Jahromi, Ravi Patel, Johan Alexander Huisman, Jan Vanderborght*
50	[767] **Soil texture linking saltwater intrusion in coastal regions to surface soil salinity** *Vahid Sobhi Gollo, Eva González, Jörg Elbracht, Peter Fröhle, Nima Shokri*
51	[943] **Pore Scale Modeling of roots and soil interaction** *Maximilian Rötzer, Alexander Prechtel, Nadja Ray*
52	[1065] **Relationship between groundwater microtemperature and electrical potential of the vegetation** *Maria Pinheiro, Günter Buntebarth, Martin Sauter*
53	[425] **Mixed-dimensional models for simulation of reactive transport in fractured porous media** *Shin Banshoya, Eirik Keilegavlen, Inga Berre*

TUESDAY, 23 MAY 2023

Poster Session II, cont.

Cromdale Hall 16:10 - 17:40

Poster board	
54	[551] **Fracture matrix pore network model (FM-PNM): an efficient pore scale modelling method of fluid flow in fractured porous media** *Chenhui Wang, Kejian Wu, Gilbert Scott, Ailin Jia, Yunsheng Wei, Zhi Guo*
55	[599] **Laboratory measurements of fluid pressure diffusion in a fractured carbonate sample** *Samuel Chapman, Simon Lissa, Jerome Fortin, Beatriz Quintal*
56	[710] **Investigation of species transport in fractured porous media using 3D-printed micromodels** *Alexandros Patsoukis Dimou, Megumi Konno, Anna Suzuki, Sebastian Geiger, Hannah Menke, Julien Maes*
57	[764] **Gas trapping mechanism and the potential impact on productivity of geothermal reservoirs** *Mathias Nehler, Thomas Reinsch, Benedikt Ahrens, Katharina Alms*
58	[215] **Microbially Induced Calcite Precipitation Treatment of Naturally Fractured Concrete: From Micro-Scale Characteristics to Macro-Scale Behaviour.** *Gloria Castro, Ronald Turner, James Minto, Grainne El Mountassir, Rebecca Lunn*
59	[266] **Microfluidic study of hydrogen conversion by Archea in porous media. A pore-scale investigation of gas conversion and controlling parameters under dynamic conditions.** *Patrick Jasek, Holger Ott, Hannes Konegger, Saeid Sadeghnejad, Loibner Andreas, Frieder Enzmann*
60	[276] **Wind erosion suppression using biological methods revisited: The use of microbial/enzymatic-induced carbonate precipitation and biopolymers** *Ehsan Nikooee, Mohammad Hemayati, Jafar Qajar, Ghassem Habibagahi, Ali Niazi, Sayed Fakhreddin Afzali*

Poster Session II, cont.

Cromdale Hall 16:10 - 17:40

Poster board	
61	[309] **Bacteria and surfactants for bio-cemented foams** *Margaux Ceccaldi, Vincent LANGLOIS, Marielle Guéguen-Minerbe, Daniel Grande, Sébastien Vincent-Bonnieu, Olivier PITOIS*
62	[192] **Quantifying the Partial Reversibility of Dispersion in Push-Pull Experiments by Means of Second Central Spatial Moments** *Marie-Madeleine Stettler, Marco Dentz, Olaf Cirpka*
63	[202] **Rayleigh-Bénard instability in heterogeneous porous media** *Rima BENHAMMADI, Juan J. Hidalgo, Marco Dentz*
64	[254] **An Upscaled Modeling Framework for Reactive Transport: A Case Study - Dry Creek, Idaho** *Zachary Sherman, Kevin Roche, Thomas Sherman, Diogo Bolster*
65	[439] **Impact of Relative Permeability Hysteresis in Numerical Simulations of Underground Hydrogen Storage in Porous Formations** *Guillermo GIACOMI, Luis Cueto-Felgueroso, Marco Dentz*
66	[440] **Mechanisms of Solute Mixing in Darcy's scale Heterogeneous Formations** *Aronne Dell'Oca, Marco Dentz*
67	[362] **Water-Oil Relative Permeability determination in 2D micromodels of vugular porous media** *Jesús Fernández, Jorge Avendaño, Marcio Carvalho*
68	[377] **Development of a micromodel design algorithm for heterogeneous reservoir rocks** *Sebastian Hogeweg, Calvin Lumban Gaol, Birger Hagemann, Leonhard Ganzer*
69	[444] **Simultaneous Interpretation Of Multiphase Fluid Flow Characteristics In Porous Media from Steady State SCAL Experiments Performed in a Microfluidic Approach** *Bettina Jenei, Hanin Samara, Nils Langanke, Roman Manasipov, Safa Al-Ismaili*

TUESDAY, 23 MAY 2023

Poster Session II, cont.

Cromdale Hall 16:10 - 17:40

Poster board	
70	[1077] **The Nature of Multiphase Flow in Microfluidic Devices** *William Rossen, Simon Cox, Afshin Davarpanah, Ewald Jacques Maximiliaan Obbens*
71	[461] **Hybrid Mathematical Modelling and Uncertainty Quantification of Underground Hydrogen Storage** *peter castellucci, Lin Ma, Oliver Jensen, Radha Boya, Igor Chernyavsky*
72	[471] **The Uncertainty of Unsteady-State Relative Permeability Measurement Protocols** *Steffen Berg, Evren Unsal, Harm Dijk*
73	[217] **Modeling Solute Transport in Heterogeneous Media with Uncertain Architecture via Physics Informed Neural Networks** *Milad Panahi, Giovanni Porta, Alberto Guadagnini, Monica Riva*
74	[573] **The negative and positive effects of hot water injection into coal seam on CBM production** *Dong Zhou, Zengchao Feng*
75	[821] **Heat transfer through pore space in packed beds of non-spherical particles** *Simson Julian Rodrigues, Nicole Vorhauer-Huget, Evangelos Tsotsas*
76	[878] **Freezing and Thawing Process in Porous Media: A Study Using Magnetic Resonance Imaging and Modeling** *Michal Snehota, Andreas Pohlmeier, Martina Sobotkova, Tomas Princ, Michal Benes, Martin Jex*
77	[960] **Polymer Thermal Degradation: Numerical Simulation and Upscaling for Field Scale Reservoir Applications** *Abdulaziz Alsaleh, Martin Blunt, Ann Muggeridge*
78	[1055] **Predicting the heat depletion characteristics of hydrothermal doublet systems under varying reservoir and operational conditions** *Chima Justin Ezekiel, Anozie Ebigbo, Thomas Finkbeiner, P. Martin Mai*

Poster Session II, cont.

Cromdale Hall 16:10 - 17:40

Poster board	
79	[674] **Delineating external stressor signals as time-variant conditions affecting DNAPL source zone formation** *Christian Engelmann, Helen K. French, Kaveh Sookhak Lari, Charles J Werth, Traugott Scheytt*
80	[829] **Laboratory scale demonstration of asbestos mobility in sandy aquifer systems** *Leonardo Magherini, Chiara Avataneo, Silvana Capella, Manuela Lasagna, Carlo Bianco, Elena Belluso, Domenico De Luca, Rajandrea Sethi*
81	[1006] **Remediation of multilayer soils contaminated by heavy chlorinated solvents using biopolymer-surfactant mixtures** *Amir Hossein Mohammadi Alamooti, Stéfan Colombano, Azita Ahmadi, Hossein Davarzani*
82	[1059] **A combined experimental and modeling study to evaluate the soil-gas monitoring for early detection of contaminants leakage into groundwater** *Hossein Davarzani, Amir Hossein Mohammadi Alamooti, Nicolas Aubert, Daniel Hubé, Valérie Guérin, Marc Crampon*
83	[306] **Digital concrete physics: Prediction of the effective elastic material properties of concrete by pressure-dependent high-resolution X-ray Computed Tomography** *Martin Balcewicz, Maxim Lebedev, Erik H. Saenger*
84	[1049] **Understanding Pore Connectivity in Hard-Templated Carbon Materials** *Nicola Michel Seraphim, Eliyahu Farber, David Eisenberg*
85	[900] **Pore-scale imaging of nonlinear multiphase flow in porous media** *Yihuai Zhang, Branko Bijeljic, Martin Blunt*
86	[903] **Non-Newtonian fluids based method for characterizing the pore structure of spherical glass bead particles** *Soheil Safari Anarkouli, Martin Lanzendörfer, Martin Slavík, Tomáš Weiss*

TUESDAY, 23 MAY 2023

Poster Session II, cont.

Cromdale Hall 16:10 - 17:40

Poster board	
87	[372] **Advanced characterization of novel multilayer cellulose based material for food packaging** *NELLY PADILLA BELLO, Mathilde Rota, Hélène Curmi, Christian Geindreau, Sabine Rolland du Roscoat*
88	[790] **Functional design of porous systems by systematic patterning of flat knits** *Leon Pauly, Lukas Maier, Ulrich Nieken, Götz T. Gresser*
89	[811] **Synthesis of granular activated carbon from biomass and correlation of its sorption properties with the pore space characteristics** *Anastasia Stavrinou, Maria Theodoropoulou, Christos Aggelopoulos, Christos Tsakiroglou*
90	[968] **Flow, heat, and transport at the scale of grains and pores in porous building materials** *Hannah Menke, Julien Maes, Kamaljit Singh*
91	[1073] **PE-based pore-filled ion exchange membranes for electrodialysis and energy conversion processes** *Jeong-Hoon Kim, Bo-ryung Park*
92	[1086] **Characterisation of porous biochar using X-ray micro-CT and FTIR techniques** *Pavel Kazakovtsev, Tannaz Pak, Kamal Elyasi Gomari, Guoting Li*

WEDNESDAY, 24 MAY 2023

Plenary Session

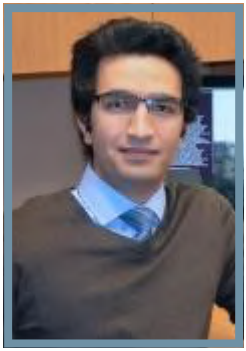
Pentland Auditorium *8:30 - 9:20*
Chair: *Azita Ahmadi*

Award Ceremony 3 *8:30 - 8:40*

InterPore Medal for Porous Media Research
Philippe Coussot
Laboratoire Navier (Univ. Gustave Eiffel-ENPC-CNRS), France

The InterPore Medal for Porous Media Research (formerly InterPore Award for Excellence in Porous Media Research) is given to scientists with an established career, in recognition of excellent research in general porous media, with emphasis on research conducted over the past 10 years.

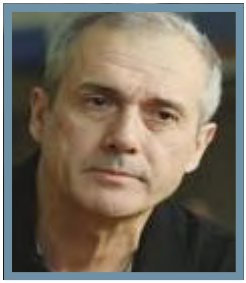
Awardees are senior scientists who have an excellent research record that has contributed to the theoretical, experimental and/or modelling advances in understanding of problems involving natural and/or industrial porous media.



InterPore Award for Porous Media Research
Pejman Tahmasebi
Colorado School of Mines, USA

The InterPore Award for Porous Media Research (formerly Procter & Gamble Award for Thin and Swelling Porous Media Research) is given to mid-career researchers in recognition of outstanding research in general porous media, with emphasis on research conducted over the past 5 years.

Plenary Lecture *8:40 - 9:20*
Pentland Auditorium
Chair: *Linda Abriola (*Brown University)



Adrian Bejan
Duke University, *USA*

Vascular Design: Freedom, Evolution, Hierarchy

Porous materials are usually thought of as amorphous mixtures of two or more things, solids, fluids, and voids. The research field started that way, and so did my own activity in it. Along the way, I was drawn to the part of nature (the physics) that was missing from the amorphous view: the structure, flow, configuration, drawing (design), purpose, and evolution.

The lecture is pictorial. It begins with defining the terms, because words have meaning: vascular, design, evolution, and prediction (theory). Next, vascular (tree shaped) architectures flow more easily than parallel channels with only one length scale (the wall to wall spacing). Transport across channels is facilitated when the spacing is such that the channel flow length matches the entrance (developing) length of the flow.

The tendency to evolve with freedom toward flow configurations that provide greater access is universal in nature, bio, and non-bio. This tendency is the Constructal Law, which empowers us to predict the evolution toward flow access, miniaturization, high density of heat transfer, and the scaling up (or down) of an existing design.

Vascular designs are icons of the design feature called hierarchy. Vasculatures occur naturally because they flow more easily than one-size designs. The movements in society are hierarchical, from city traffic to global air traffic, fuel consumption, and wealth. The future of evolutionary design everywhere points toward vascular, hierarchical flow architectures that will continue to morph with freedom and directionality.

WEDNESDAY, 24 MAY 2023

Oral presentations: Parallel sessions 3.1

9:30 - 10:30

MS01: Porous Media for a Green World: Energy & Climate - *Part 6*

Tinto

Chairs: *Maartje Boon & Anna Herring*

9:30	[459] **Understanding the impact of carbon mineralisation on the flow properties of basalts** *Eleni Stavropoulou, Lyesse Laloui*
9:45	[467] **Insights into safe CO2 injection and storage scenarios in tight chalk reservoir samples** *Rasoul Mokhtari, Ali Talaei, Mohammad Reza Hajiabadi, Hamid M. Nick, Karen Feilberg*
10:00	[489] **Effects of Thermal Shocks on Cement for CCS under Confined and Unconfined Conditions**
10:15	[505] **Injectivity losses in sandstones during CO2 hydrates formation** *Matthieu Mascle, Ameline Oisel, Nicolas Gland, Anne Sinquin, Raymond Jellema, Luc Pauget, Souhail Youssef*

MS05: Biochemical processes and biofilms in porous media - *Part 4*

Carrick

Chairs: *Veronica Morales & Roseanne Ford*

9:30	[910] **Recent insights on the coupled processes and potential applications of microbially induced desaturation and precipitation by nitrate-reducing bacteria** *Leon van Paassen*
9:45	[371] **Engineered soil-mycelia systems for slope stabilisation** *Grainne El Mountassir, Alireza Fathollahi, Qi Zhang*
10:00	[310] **Microfluidic and numerical investigation of anisotropic permeability alteration during biomineralization in porous media** *Felix Weinhardt, David Krach, Jingxuan Deng, Johannes Hommel, Holger Class, Holger Steeb*
10:15	[917] **Using Low-Field Nuclear Magnetic Resonance and Computed Tomography Imaging to Explore Potential of Ureolysis-Induced Calcium Carbonate Precipitation Treatment to Seal Fractures in Shale** *Matthew Willett, Kayla Bedey, Laura Dobeck, Dustin Crandall, Johnathan Moore, Jonny Rutqvist, Al Cunningham, Joseph Seymour, Adrienne Phillips, Catherine Kirkland*

Oral presentations: Parallel sessions 3.1, cont.

9:30 - 10:30

MS12: Advances in Computational and Experimental Poromechanics - *Part 1*

Lammermuir 1

Chairs: *Amir Haghi & Ruben Juanes*

9:30	[677] **Photoporomechanics: Visualizing and quantifying the evolving effective stress in 3D fluid-filled granular media** *Wei Li, Yue Meng, Ruben Juanes*
9:45	[631] **Scaled Physical Modeling of CO2 Cyclic Injection Process in A Heterogeneous Unconsolidated Sandstone Formation using Additive Manufacturing and Geotechnical Centrifuge Technologies** *Daniel Cartagena-Pérez, Alireza Rangriz-Shokri, Gonzalo Zambrano, Richard Chalaturnyk*
10:00	[222] **A novel CPR/block preconditioning framework for two-phase flow simulations in porous media by mixed hybrid finite elements** *Stefano Nardean, Massimiliano Ferronato, Ahmad Abushaikha*
10:15	[378] **The role of pore fluids in supershear earthquake ruptures** *Pedro Pampillon Alonso de Velasco, David Santillan Sanchez, Juan Carlos Mosquera Feijoo, Luis Cueto-Felgueroso*

MS08: Mixing, dispersion and reaction processes across scales in heterogeneous and fractured media - *Part 6*

Lammermuir 2

Chairs: *Marco Dentz & Branko Bijeljic*

9:30	[762] **Effect of evaporating surface to volume ratio on crystallization dynamics and damage caused by NaCl crystallization in porous media** *Rozeline Wijnhorst, Femke Van der Sloot, Leo Pel, Noushine Shahidzadeh*
9:45	[307] **Pore-scale investigations of two-phase flow on mineral reaction rate** *Hang Deng, Xin Wang*
10:00	[704] **Chaotic mixing due to oscillatory flow in porous media** *Gaute Linga, Tanguy Le Borgne*
10:15	[412] **How probabilistic nucleation controls spatiotemporal dynamics and dimensionality of mineral growth in porous media?** *Mohammad Nooraiepour, Mohammad Masoudi, Helge Hellevang*

WEDNESDAY, 24 MAY 2023

Oral presentations: Parallel sessions 3.1, cont.

9:30 - 10:30

MS06-B: Interfacial phenomena across scales - *Part 3*

Monteith

Chairs: *Oshri Borgman, Nathaly Lopes Archilha & Kamaljit Singh*

9:30	[80] **Pore-scale modeling using 3D electron tomography data of the cathode catalyst layer of a PEM fuel cell** *Supriya Bhaskaran, Nicole Vorhauer, Jasna Jankovic*
9:45	[118] **Experimental investigation of two-phase flow with a table-top optical scanner: the competition between viscous and gravitational effects under different boundary conditions** *Joachim Falck Brodin, Per Arne Rikvold, Marcel Moura, Renaud Toussaint, Knut Jorgen Maloy*
10:00	[293] **Transport of hydrophobic nanoparticles in partially saturated porous media: Attachment at fluid interfaces** *Youssra Rahham, Stephen Dauphinais, Jeffrey Gostick, Marios Ioannidis*
10:15	[663] **Drainage pore-invasion patterns in porous media: role of interfacial dynamics** *Mahdi Mansouri-Boroujeni, Cyprien Soulaine, Mohamed Azaroual, Sophie Roman*

MS22: Manufactured Porous Materials for Industrial Applications - *Part 2*

Harris

Chairs: *Oleg Iliev & Javad Shokri*

9:30	[81] **Diffusion properties of the gas diffusion layer from three dimensional digital images of the fibrous substrate and the microporous layer** *Mohamed el Moustafa Ahmed Maloum, Thomas DAVID, Laure GUETAZ, Paul DURU, Joël PAUCHET, Michel Quintard, Marc Prat*
9:45	[45] **MOF sensors for contaminant capture and detection: cooperative computational-experimental screening approach** *Paul Iacomi, Ezgi Gulcay-Ozgan, Guillaume Rioland, Guillaume Maurin, Sabine Devautour-Vinot*
10:00	[189] **An Efficient Method to Compute Capillary Pressure Functions and Relative Permeability Curves in Dual Porosity Systems Arising in LCM Processes** *Dominik Becker, Stefan Rief, Konrad Steiner*
10:15	[919] **Generating multi-modal pore size distributions for low-density micro-porous carbons using virtual void method in quenched molecular dynamics simulations** *Zhifen Luo, Stephen Burrows, Edo Boek*

Oral presentations: Parallel sessions 3.1, cont.
9:30 - 10:30

MS11: Microfluidics and nanofluidics in porous systems - *Part 2*
Lowther
Chairs: *Cyprien Soulaine & Jenna Poonoosamy*

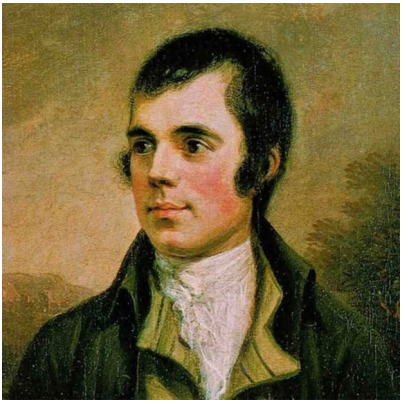
9:30	[85] **Investigation of Nanogel Transport in Porous Media by Microfluidic Models** *baojun bai, Junchen Liu, Yangling Wang*
9:45	[176] **Colloidal transport and clogging of a rock-like porous medium: effects of concentration, hydrodynamic stresses and geometry on particle deposition.** *Anne-Sophie ESNEU, Jalila Boujlel, Claire Marlière, Lahcen Nabzar, Arnaud Erriguible, Samuel Marre*
10:00	[410] **Pore-scale visualization of emulsion flow in linear and radial microfluidic porous media** *Clarice Amorim, Amanda da Costa e Silva de Noronha Pessoa, Ranena V. Ponce F., Marcio Carvalho*
10:15	[470] **Experimental study of drying in the presence of fluorescent particles in a model porous medium** *Elisa Ghiringhelli, Marc Prat, Manuel MARCOUX*

MS15: Machine Learning and Big Data in Porous Media - *Part 5*
Ochil
Chairs: *Hongkyu Yoon & Teeratorn Kadeethum*

9:30	[159] **Quantifying pore surface roughness of sedimentary rocks based on SEM images using artificial intelligence techniques** *Ahmed Zoeir, Jafar Qajar, Mehdi Shabaninejad, Hamed Aghaei, Veerle Cnudde*
9:45	[111] **Optimization of the CO2 injection location in heterogeneous siliciclastic reservoirs using graph theory** *Achyut Mishra, Ralf Haese*
10:00	[376] **Physics-Informed Deep Learning for Reactive Transport of Volatiles in Cellulose-based Porous Media** *Alexandra Serebrennikova, Raimund Teubler, Ekaterina Baikova, Eduardo Machado Charry, Karin Zojer*
10:15	[962] **Accelerating continental-scale groundwater simulation with a fusion of machine learning, integrated hydrologic models and community platforms** *Reed Maxwell, Laura Condon, Elena Leonarduzzi, Yueling Ma, Andrew Bennett, Hoang Tran, Peter Melchior*

DO YOU KNOW....EDINBURGH?

Robert Burns



On the 25th of January each year, Scotland pays tribute to Robert Burns, one of the most celebrated poets in the world. Born in Ayrshire in 1759, Robert Burns is Scotland's national bard. Affectionately known as 'the Ploughman Poet', his verses stand as a fitting testament to Scotland's proud literary history. A Burns supper is an occasion to celebrate Scotland's cultural heritage. The centrepiece of any good Burns Supper menu is the iconic haggis (a savoury pudding of sheep's heart, liver and lungs) that is traditionally piped in, i.e. brought in with a chorus of Scottish bagpipes, and then serenaded with a recital of Address to a Haggis. The supper is rounded up with a glass of single malt Scottish Whisky and a series of toasts, including an Address to the Lassies and Reply to the Laddies; a few steps of Ceilidh dance, a type of Gaelic folk dance, and finally everyone joins hands to sing Auld Lang Syne before going their separate ways.

WEDNESDAY, 24 MAY 2023

Coffee Break & Exhibition

Cromdale Hall 10:30 - 12:00

Refreshments are available in the poster and exhibition hall. Come grab a snack, network with other attendees, visit the exhibition booths and discuss the posters on display.

Poster Session III

Cromdale Hall 10:30 - 12:00

Poster board	
1	[65] **Performance characterization of oil-based drilling-mud contaminated cement as a barrier material** *Elie Ngouamba, Maillet Benjamin, Rahima SIDI-BOULENOUAR, Philippe Coussot, Nils Opedal*
2	[142] **Investigation of supercritical CO2 mass transfer in porous media using X-ray micro-computed tomography** *Ruotong Huang, Anna Herring, Adrian Sheppard*
3	[153] **Quick Clay: A novel alternative for well decommissioning** *Lucas Hand, Matteo Pedrotti, Rebecca Lunn*
4	[187] **The impact of multi-scale geological heterogeneities on geothermal reservoir performance** *Kiley Baird, Sebastian Geiger, Florian Doster, Dan Arnold, Carl Jacquemyn, Dmytro Petrovskyy, Jackson Matthe*
5	[196] **Impact of Relative Permeability Hysteresis on Underground Hydrogen Storage** *Diya Sunil Kumbhat, Anozie Ebigbo*
6	[265] **Numerical design of nano-porous carbon binder domain (CBD) phase in lithium-ion battery electrodes** *Ruihuan Ge, Denis Cumming, Rachel Smith*
7	[329] **Modeling Subsurface Hydrogen Storage With Transport Properties From Entropy Scaling Using the PC-SAFT Equations of State** *Johannes Eller, Tim Sauerborn, Beatrix Becker, Ivan Buntic, Joachim Groß, Rainer Helmig*

Poster Session III, cont.

Cromdale Hall 10:30 - 12:00

Poster board	
8	[1052] **Drag Reducing Agents for Geothermal Applications** *Sian Jones, Ronald Driessen, Dries van Nimwegen, Pejman Shoeibi Omrani, Pacelli Zitha*
9	[1071] **Waste Rock and Bentonite Mixtures for Gas Management within Low Heat Generating Waste Geological Disposal Facilities** *Elise Mouat, Ian Molnar, McDermott Christopher, Bryne Ngwenya, George Towler, Clare Bird*
10	[139] **A Macroscopic Model for Unsaturated Flow in Deformable Evolving Porous Media** *Matteo Icardi*
11	[319] **Quantifying shrinkage of natural clay samples with an automated high-frequency measurement set-up** *Bente Lexmond, Cjestmir Hockin, Bas van Dam, Jasper Griffioen, Gilles Erkens, Esther Stouthamer*
12	[429] **Gradient hydrogel based on self-filtration** *Clement de Loubens, Hugues Bodiguel, Alice Vilotte, Christophe Schmitt, Deniz Gunes, Emilie Guilbert*
13	[522] **A method to measure adsorptive-poroelastic properties for nanoporous adsorbents** *David Espinoza, Alexander Neimark, Stephan Braxmeier, Gudrun Reichenauer*
14	[322] **Bacterial chemotaxis in heterogeneous porous media in the presence of nutrient hot spots and flow** *Maximilian Stoll, Roman Stocker, Joaquin Jimenez-Martinez*
15	[355] **Biomineralisation of Calcium Carbonate via Ureolytically Active Fungi** *Jason Eriksen, Grainne El Mountassir, Rebecca Lunn*
16	[404] **Characterising the development of fungal networks in complex porous media** *Qi Zhang, Grainne El Mountassir, Alireza Fathollahi*

WEDNESDAY, 24 MAY 2023

Poster Session III, cont.

Cromdale Hall 10:30 - 12:00

Poster board	
17	[513] **Quantifying the Influence of Groundwater Flow on Bacterial Chemotaxis near a NAPL Contaminant Source at the Pore Scale** *Beibei Gao, Roseanne Ford*
18	[16] **Perturbation Theory and Green's Function to Solve the Non-Linear Dispersion Saturation Equation arising in Cyclic Injection-Production Well Tests** *Cintia Goncalves Machado, Albert Reynolds*
19	[40] **Microscopic production characteristics and influencing factors of micro-nano pores in shale oil enhanced oil recovery by air injection** *Meng Du, zhengming yang, weifeng lv, Lanlan Yao, Xinliang Chen, yilin chang, Liang Ma*
20	[47] **A hybrid MPM-CFD model for simulating multiphase flow in deformable porous media.** *Quoc Anh Tran*
21	[122] **Interfacial instability on dewetting in a capillary tube: from gradient to complex geometry** *Si Suo, Shervin Bagheri*
22	[186] **Aging of liquid foam confined in porous media** *Ali Salamé, Vincent LANGLOIS, Olivier PITOIS*
23	[227] **Experiment and simulation of quasistatic fluid invasion resulting in pressure-saturation (p-s) hysteresis** *Animesh Nepal, Ivan Lunati, Jordi Ortin, Juan J. Hidalgo, Marco Dentz*
24	[335] **Diagenetic Quantification in Relation to Pore Size Population Using Digital Rock Technology** *NUR SHUHADAH BINTI JAPPERI, Kejian Wu, ANDREW STARKEY, PANAITESCU CIPRIAN-TEODOR*
25	[436] **Effect of CO2 dissolution on elastic instabilities of the polymer through porous media** *Mohsen Mirzaie Yegane, Esther Zijlstra, Ali Fadili, Diederik van Batenburg, Thierry Leblanc, Pouyan E. Boukany*

Poster Session III, cont.

Cromdale Hall 10:30 - 12:00

Poster board	
26	[286] **GPSFLOW: A Novel Simulator for Modelling Underground Hydrogen and Gas Mixture Storage in Rough Reservoir** *Zuansi Cai, Keni Zhang, Juan Padrino, Chris McClane, Chaobin Guo, Mark Cullen*
27	[422] **Modeling Two Phase Flow in Fractured Rocks Considering Hydromechanical Behaviour and Fluid Leakage** *Zhen Zhang, Xupeng He, Yiteng Li, Marwa AlSinan, hyung kwak, Hussein Hoteit*
28	[1030] **Sparsified coarse-scale operators for multiscale methods** *Omar Chaabi, Mohammed Saad Al Kobaisi*
29	[507] **Solute transport in partially saturated porous media with spatially correlated disorder** *Ali Saeibehrouzi, Ran Holtzman, Petr Denissenko, Soroush Abolfathi*
30	[555] **An experimentally validated conceptual model for numerical simulation of accelerated dissolution trapping of CO2 in low-permeable fractured reservoirs** *Ali Akbar Eftekhari, Yao Xu, Yibo Yang, Wei Yan*
31	[564] **Applying Thermodynamic Framework to Analyze Transport Self-Organization Due to Dissolution/Precipitation Reaction in Porous Medium at Varying Peclet Number: Entropy, Enthalpy, Heterogeneity** *Evgeny Shavelzon, yaniv edery*
32	[586] **Hydraulic attributes of heterogeneous pore spaces** *Wenqiao Jiao, David Scheidweiler, Alberto Guadagnini, Pietro De Anna*
33	[623] **Effects of time-dependent velocity fields on the dynamics of chemical transport in porous media** *Dan Elhanati, Ishai Dror, Brian Berkowitz*
34	[635] **Hallmarks of chaotic mixing in two dimensional unsteady porous media flow** *Kevin Pierce, Gaute Linga, Marcel Moura*

WEDNESDAY, 24 MAY 2023

Poster Session III, cont.

Cromdale Hall 10:30 - 12:00

Poster board	
35	[83] **Thermoregulation and Ventilation in Termite Nests: Towards Bio-Inspired Solutions to Design Energy Efficient Buildings** *Nengi Karibi-Botoye, Guy Theraulaz, Vasily Demyanov, Bagus P. Muljadi, Athos Nathanail, Hannah Menke, Julien Maes, Kamaljit Singh*
36	[204] **The effects of a variable interface permeability on a one-domain VANS model** *Bruno Dias, Jeremie B. E. Meurisse, Nagi N. Mansour*
37	[334] **GeoChemFoam, the open-source pore-scale modelling toolbox** *Julien Maes, Hannah Menke*
38	[354] **Predictive Digital Rock Physics simulation applied on a Sandstone Reservoir** *Mohamed Regaieg, Titly Farhana Faisal, Franck Nono, Cyril Caubit*
39	[569] **A color-gradient lattice Boltzmann model for fluid flow with high density and viscosity ratios** *Reza Haghanihasanabadi, Hamidreza erfaniGahrooei, James McClure, eirik flekkøy, Carl Fredrik Berg*
40	[1028] **Pore-scale Modelling of Salt and Hydrate Formation During CO2 Injection** *Saleh Mohammadrezaei, Rouhi Farajzadeh, Vahid Niasar*
41	[106] **Characterization shale's pore structure of shale: Multi-experimental imaging technique with machine learning** *Lei Liu, Jun Yao, Hai Sun, Lei Zhang*
42	[530] **Controlling colloid transport through porous media via local gradients of solute concentration** *Mamta Jotkar, Ilan Ben-Noah, Juan J. Hidalgo, Marco Dentz, Luis Cueto-Felgueroso*
43	[606] **Evaluation of phase and inter-phase fractal dimensions during two-phase primary drainage in a microfluidic cell** *Nikolaos Karadimitriou, Alexandros Terzis, Dongwon Lee, Samaneh Vahid Dastjerdi, Holger Steeb*

Poster Session III, cont.

Cromdale Hall 10:30 - 12:00

Poster board	
44	[490] **Fast workflow to estimate petrophysical properties: From Digital Rock Physics Scale to Laboratory Scale** *marco miarelli, Leili MOGHADASI*
45	[1082] **Simulation of CO2 Injection and Development of Proxy Models for Svelvik CO2 Field Lab** *Wilson Wiranda, Ashkan Jahanbani, Cathrine Ringstad, Alv-Arne Grimstad*
46	[648] **Effect of Phase Change in Gas Diffusion Layer on Performance of a PEM Fuel Cell – a modelling study** *Grace Aguah, Daniel Niblett, Vahid Niasar*
47	[733] **Predictions for the porosity dependence of elastic properties and ultrasound wave velocities in isotropic porous media** *Willi Pabst, Petra Šimonová, Eva Gregorová*
48	[740] **Montoring the reversible low-to-high-quartz transition and irreversible elastic property changes in sandstone via temperature-dependent impulse excitation** *Eva Gregorová, Willi Pabst, Lucie Kotrbová*
49	[717] **Intracellular "in silico microscopes" - fully 3D spatial Hepatitis C virus replication model simulations** *Markus Knodel, Arne Naegel, Eva Herrmann, Gabriel Wittum*
50	[840] **Towards a clinically relevant porous media model for vertebroplasty** *Zubin Trivedi, Jan-Sören Völter, Arndt Wagner, Tim Ricken, Oliver Röhrle*

WEDNESDAY, 24 MAY 2023

Oral presentations: Parallel sessions 3.2

12:00 - 13:00

MS01: Porous Media for a Green World: Energy & Climate - *Part 7*

Tinto

Chairs: *William Rossen & Brian Ellis*

12:00	[514] **Experimental measurements on caprock CO₂-water wettability at reservoir pressure and temperature** *Mohamed M. Awad, David Espinoza*
12:15	[1037] **Insights into sandstone wettability alteration during cyclic scCO$_2$-brine injections** *Anna Herring, Chenhao Sun, Ryan Armstrong, Zhe Li, James McClure, Mohammad Saadatfar*
12:30	[662] **The effect of mixed convection and hydrodynamic dispersion on CO2 dissolution in saline aquifers** *Ravid Rosenzweig*
12:45	[687] **A robust and efficient deep-learning-based surrogate model for CO2 storage in deep saline aquifers** *Mengjie Zhao, Yuhang Wang, Hadi Hajibeygi, Marc Gerritsma*

MS20: Biophysics of living porous media: theory, experiment, modeling and characterization - *Part 1*

Carrick

Chairs: *Dominik Obrist & Tobias Koeppl*

12:00	[117] **Impact of large periodic deformations on solute transport in soft porous media** *Matilde Fiori, Chris MacMinn, Satyajit Pramanik*
12:15	[745] **Blood-flow simulations in three-dimensional aneurysms using LBM: From risk-assessment to follow-up treatment decisions** *Stephan B. Lunowa, Markus Muhr, Natalia Nebulishvili, Barbara Wohlmuth*
12:30	[741] **A volume-averaged model for acoustic streaming induced by focused ultrasound in soft porous media** *Sebastian Price, Rune Hansen, Magnus Gjennestad*
12:45	[327] **Data-integrated tracer transport simulations in brain tissue: vascular networks, perivascular spaces, extra-vascular tissue** *Timo Koch, Vegard Vinje, Kent-Andre Mardal,*

Oral presentations: Parallel sessions 3.2, cont.

12:00 - 13:00

MS04: Swelling and shrinking porous media - *Part 1*

Lammermuir 1

Chairs: *Yida Zhang, Yihuai Zhang & Chris MacMinn*

12:00	[995] **Poromechanics of a yeast aggregate placed under fluid constraints** *Térence Desclaux, Pierre Joseph, Paul DURU, Morgan Delarue, Olivier Liot*
12:15	[1] **A multiscale theory explaining the initial shrinkage of microporous materials upon adsorption** *Yida Zhang*
12:30	[221] **Coupled numerical modeling of the China Mock-Up experiment for swelling clay barriers** *Aqeel Afzal Chaudhry, Dmitri Naumov, Wenqing Wang, Thomas Nagel*
12:45	[529] **A fully coupled hydro-mechanical modelling for describing gas transport in coal matrix** *Ahmad MOSTAFA, luc scholtes, Fabrice GOLFIER*

MS06-B: Interfacial phenomena across scales - *Part 4*

Monteith

Chairs: *Nathaly Lopes Archilha & Kamaljit Singh*

12:00	[95] **A molecular simulation study for interfacial tensions, solubilities, and transport properties of the H2/H2O/NaCl system relevant for Underground Hydrogen Storage** *Willemijn van Rooijen, Parsa Habibi, Poulumi Dey, Thijs. Vlugt, Hadi Hajibeygi, Othonas Moultos*
12:15	[368] **Multiphase relaxation processes at the µm-to-cm scale during storage of gases in rocks** *Sharon Ellman, Catherine Spurin, Samuel Jackson, Catrin Harris, Ben Callow, Shan Wang, Gulce Kalyoncu, Tom Bultreys*
12:30	[669] **Surface relaxivity and its role in permeability prediction** *Ricardo Leiderman, Alexsander Cunha, Rafael da Silva Vianna, Pedro Vianna, André Souza, Pedro Lopes, André Maués Brabo Pereira, Rodrigo Bagueira*
12:45	[941] **Combining Molecular Dynamics and Machine Learning to determine CO2 adsorption features on amorphous nanosurfaces** *Ivan Lunati, Andrea Ferrari*

WEDNESDAY, 24 MAY 2023

Oral presentations: Parallel sessions 3.2, cont.

12:00 - 13:00

MS07: Mathematical and numerical methods for multi-scale multi-physics, nonlinear coupled processes - *Part 1*

Harris

Chairs: *Jakub Both & Nadja Ray*

12:00	[661] **Resonance, Rayleigh Flows and Thermal Choking: Convective Electromagnetic Energy Harnessing from Absorbing Porous Media.** *Burt Tilley, Vadim Yakovlev, Ajit Mohekar*
12:15	[843] **Modeling plant water deficit by Richards' equation with a non -local root water uptake term** *Marco Berardi, Giovanni Girardi*
12:30	[519] **Chemo-Hydro-Mechanical variational phase-field fracture model in cementitious systems** *Mostafa Mollaali, Renchao Lu, Vanessa Montoya, Olaf Kolditz, Keita Yoshioka*
12:45	[208] **Upscaling and Automation: New Opportunities for Multiscale Systems Modeling** *Ilenia Battiato, Kyle Pietrzyk*

MS11: Microfluidics and nanofluidics in porous systems - *Part 3*

Lowther

Chairs: *Cyprien Soulaine & Sophie Roman*

12:00	[445] **Impact of nanoparticles and gas composition on bubble density and coarsening rate of confined CO2-foam under high-pressure high-temperature conditions** *Aurora Pérez, Juliana Maria da Fonseca Façanha, Leandro Freitas Lopes, Grigori Chapiro, RODRIGO Weber dos SANTOS, Felipe Ribeiro, Pablo Godoy, Luis Maqueira, Giulia Fritis*
12:15	[483] **Capillary-controlled phase transitions in caprock over CO2 storage in aquifer simulated by nanofluidic pore models** *Armin Mozhdehei, Lionel Mercury, Aneta Slodczyk*
12:30	[856] **Microscopic transport and phase behaviors of CO2 injection in heterogeneous formations using microfluidics** *Yaohao Guo, Zhi Xu, Bo Bao*
12:45	[62] **Brine drying and salt precipitation in porous media: microfluidics quantification of pore heterogeneity and wettability impact** *Hui Zhang, Zhonghao Sun, Nan Zhang, Budi Zhao*

Oral presentations: Parallel sessions 3.2, cont.

12:00 - 13:00

MS15: Machine Learning and Big Data in Porous Media - *Part 6*

Ochil

Chairs: *Dieter Froning & Amer Alanazi*

12:00	[42] **Machine Learning for the Characterization of Fibrous Gas Diffusion Layers for Polymer Electrolyte Fuel Cells** *Dieter Froning, Eugen Hoppe, Ralf Peters*
12:15	[129] **Data-Driven Machine Learning Modeling of Mineral/H2/ Brine Wettability Prediction: Implications for Hydrogen Geo-Storage** *Muhammad Ali, Zeeshan Tariq, Amer Alanazi, Aliakbar Hassanpouryouzband, Nurudeen Yekeen, Bicheng Yan, Hussein Hoteit*
12:30	[150] **Prediction of CO2 adsorption potential on coal using various machine learning techniques for CCUS application in coal formation** *Amer Alanazi, Ahmed F. Ibrahim, Salaheldin Elkatatny, Saleh Bawazer, Hussein Hoteit*
12:45	[826] **Dynamic Mode Decomposition to reconstruct and extrapolate hydrological time series** *Giulia Libero, Daniel Tartakovsky, Valentina Ciriello*

WEDNESDAY, 24 MAY 2023

SAC Student Workshop A
Lennox Suite 12:00 - 13:00

What makes a good research paper? 10 tips for success

Jaime Gómez-Hernández

Through several real cases, the attendants will learn the common mistakes made when submitting a manuscript for consideration to a specialized journal. Everything will be presented using examples based on actual submissions in a very casual and lively way. Many previous attendants to this workshop have overcome the hurdle of the dreaded rejection letter. For many years, Professor Gómez-Hernández has served on the Editorial Boards of the Journal of Hydrology, Journal of Hydrogeology and Mathematical Geology. He is still a member of the boards of Advances in Water Resources, Mathematical Geosciences, Water, and Springer Nature Applied Science. He has rejected too many manuscripts in the last 20 years and can tell you what to do to avoid rejection. He will also discuss how to deal with non-scientific reviews and what to do when you know the review/reviewer is incorrect.

This event is free and open to all participants of InterPore2023!

Lunch Break
13:00 - 14:15

See "Area Restaurants" in the Logistics menu on the Whova app for information on restaurants near the EICC.

SAC Student Workshop B

Lennox Suite 14:15 - 15:30

BetterPoster: How to create a better research poster in less time

Mike Morrison

Posters are a huge part of academic life. At most conferences, there will be a room where attendees can hang up their posters, and specific parts of the conference where researchers are encouraged to read posters and discuss them with the author. You are probably familiar with the experience: rows and rows of giant boards alerting passers-by to the newest research in the field. These posters are supposed to serve as jumping-off points for scientists to discuss their work and efficiently convey new insights to someone navigating the hall in an hour or less. Unfortunately, the typical conference poster, which is long on information and short on design, fails on both points. This means that at each conference, important information is glossed over or missed entirely.

The #BetterPoster makes you think about how you're presenting the information. The clearer your message, the more people will remember and engage with your research. And that's what poster sessions are all about!

This event is free and open to all participants of InterPore2023!

DO YOU KNOW....EDINBURGH?

Dynamic Earth

Situated at the foot of Edinburgh's spectacular Salisbury Crags, Dynamic Earth invites you to take a journey through time to witness the story of planet Earth. You'll be embarking on the interactive adventure of a lifetime – the lifetime of our planet! It's a chance to experience the primeval forces of nature as they shaped our planet and go on a 4D adventure around the world. Travel back to the beginning of time in the Deep Time Machine, plunge into the ocean depths in a yellow submarine, fly high above ice-cold glaciers and marvel at their power as they carve out entire continents. Dynamic Earth is also home to one of Scotland's only fully digital, state-of-the-art 360° Planetariums, with a wide variety of live presenter-led shows and films showing throughout the year. Whether you want to learn or play, Dynamic Earth will satisfy kids and scientists alike.

WEDNESDAY, 24 MAY 2023

Oral presentations: Parallel sessions 3.3

14:15 - 15:30

MS01: Porous Media for a Green World: Energy & Climate - *Part 8*

Tinto

Chairs: *Brian Ellis & Kai Li*

14:15	[703] **CT visualization of the CO2 degassing process in porous media** *Chris Boeije, Cas Verweij, Anushka Tripathi, Pacelli Zitha, Anne Pluymakers*
14:30	[774] **A micro-scale study of CO2 mobility control characteristics of a green foam in porous media** *Tongke Zhou, Qichao Lv, Vahid Niasar*
14:45	[809] **Calibration curve generation for the use of Xenon as a pressure indicator in porous media using micro computed tomography** *Antje van der Net, Maja Ruecker, Mark Willemsz*
15:15	[833] **Influence of Capillarity on Salt Precipitation during Primary CO2-Brine Displacement** *Boris Jammernegg, Denis Martynov, Theresa Schollenberger, Johannes Hommel, Gerald Stiedl, Bernd Flemisch, Holger Ott*

Oral presentations: Parallel sessions 3.3, cont.

14:15 - 15:30

MS20: Biophysics of living porous media: theory, experiment, modeling and characterization - *Part 2*

Carrick

Chairs: *Dominik Obrist & Tobias Koeppl*

14:15	[379] **In Vitro Characterization of Lingering Red Blood Cells In Capillary Networks** *Aurelia Bucciarelli, Alberto Mantegazza, Dominik Obrist*
14:30	[260] **Anomalous transport in brain microvascular networks** *Florian Goirand, Tanguy Le Borgne, Sylvie Lorthois*
14:45	[383] **Numerical methods for simulating flows in biological networks** *Tobias Koeppl*
15:00	[777] **Modeling contraction in linearly elastic tissue using point sources** *Wietse Boon, Fred Vermolen*
15:15	[281] **Theoretical and experimental study of intracellular transport using a porous media approach** *Olivier Destrian, Morgan Chabanon, Nicolas Moisan, René-Marc Mège, Benoît Ladoux, Benoit Goyeau*

WEDNESDAY, 24 MAY 2023

Oral presentations: Parallel sessions 3.3, cont.

14:15 - 15:30

MS04: Swelling and shrinking porous media - *Part 2*

Lammermuir 1

Chairs: *Chris MacMinn, Yihuai Zhang & Yida Zhang*

14:15	[320] **Magnetic resonance imaging of the swelling of polymeric hydrogels** *Didier STEMMELEN, Feina XU, Sébastien LECLERC*
14:30	[557] **Influence of interaction between confined hydrogel beads on their growth swelling dynamics** *Sebastián Ariel Falcioni, Yanina Lucrecia Roht, Leonardo David Binda, German Drazer, Irene Paula Ippolito*
14:45	[278] **Linear stability analysis for the formation of wrinkles on confined swelling hydrogels** *Joseph Webber, Michael Worster*
15:00	[578] **Drying-induced bending of hydrogel disks** *Jean-Francois Louf, Haohui Zhang, MaryKate Neff, Yuhang Hu, Sujit Datta*
15:15	[258] **Pattern Formation in Crumpled Hydrogel upon Rapid Dehydration with Acetone** *George Fortune, Merlin Etzold, Stuart Dalziel, Julien Landel*

Oral presentations: Parallel sessions 3.3, cont.

14:15 - 15:30

MS06-A: Physics of multiphase flow in diverse porous media - *Part 5*

Monteith

Chairs: *Yu Jing & Yaniv Edery*

14:15	[339] **Analytical and numerical investigations of imbibition in porous media** *Akshit Agarwal, Jyoti Phirani*
14:30	[959] **Dissolution of trapped CO2 in carbonates rock at high pressure and high temperature conditions using X-ray micro-tomography** *Abdul Hakim Mazeli, Hannah Menke, Julien Maes, Kamaljit Singh*
14:45	[517] **Trapping Behavior of Gases from 4D Pore Scale Imaging** *Ying Gao, Tibi Sorop, Niels Brussee, Hilbert van der Linde, Karin de Borst, Rouhi Farajzadeh, Steffen Berg*
15:00	[124] **Multiphase flow dynamics effect on microscale phase configuration** *Ilan Ben-Noah, Juan J. Hidalgo, Joaquin Jimenez-Martinez, Yves Méheust, Marco Dentz*
15:15	[814] **Nonequilibrium and cooperative behavior in quasistatic fluid-fluid displacements underpin energy dissipation and hysteresis in the passage through constrictions** *Ran Holtzman, Marco Dentz, Marcel Moura, Ramon Planet, Jordi Ortin*

WEDNESDAY, 24 MAY 2023

Oral presentations: Parallel sessions 3.3, cont.

14:15 - 15:30

MS07: Mathematical and numerical methods for multi-scale multi -physics, nonlinear coupled processes - *Part 2*

Harris

Chairs: *Jakub Both & Nadja Ray*

14:15	[121] **Recent Contributions to the Study of Immiscible Viscous Fingering** *Kenneth Sorbie, Alan Beteta, Arne Skauge*
14:30	[714] **Global implicit solver for multiphase multicomponent flow in porous media with multiple gas components and general reactions** *Markus Knodel, Serge Kräutle, Peter Knabner*
14:45	[617] **A study of a non-equilibrium model with relative permeability hysteresis in two-phase water-oil system** *Eduardo Abreu, Paola Cunha Ferraz, Wanderson Lambert*
15:00	[625] **Compositional Multiphase Flow Simulation: Challenges and Treatment by Deep Learning** *Shuyu Sun, tao zhang, Tian Qiao*
15:15	[769] **Four-phase equilibrium calculation algorithm for water/ hydrocarbon mixtures** *Martin Jex, Abbas Firoozabadi, Jiří Mikyška*

Oral presentations: Parallel sessions 3.3, cont.

14:15 - 15:30

MS11: Microfluidics and nanofluidics in porous systems - *Part 4*

Lowther

Chairs: *Sophie Roman & Cyprien Soulaine*

14:15	[654] **Gelation in model porous media investigated with environmentally-sensitive molecular rotors** *Romane Le Dizès, Elham Mirzahossein, Marion Grzelka, Daniel Bonn, Sara Jabbari Farouji, Noushine Shahidzadeh*
14:30	[711] **The permeability of pillar arrays in microfluidic devices: an application of Brinkman's theory towards wall friction** *Thejas Hulikal Chakrapani, Hanieh Bazyar, Rob Lammertink, Stefan Luding, Wouter den Otter*
14:45	[823] **Displacement enhancement by nanogel-in-oil suspension with macroemulsion evolution in porous media** *Xukang Lu, Moran Wang*
15:00	[824] **Clogging and particle accumulation during the flow of suspensions of solid particles in model 2D porous media.** *Hugues Bodiguel, Youness Soumane, Antoine Naillon*
15:15	[1078] **Hydrate film formation in subsea carbon storage** *Wen Song, David Fukuyama, Hugh Daigle*

WEDNESDAY, 24 MAY 2023

Oral presentations: Parallel sessions 3.3, cont.

14:15 - 15:30

MS10: Advances in imaging porous media: techniques, software and case studies - *Part 2*

Ochil

Chairs: *Liwei Zhang & Maja Ruecker*

14:15	[291] **A digital core reconstruction method based on discrete element method considering the actual shape of rock particles** *Chunqi Wang, Jun Yao*
14:30	[427] **Flow field analysis towards improved predictability of diffusive flux in host rocks for radioactive waste** *Cornelius Fischer, Till Bollermann, Johannes Kulenkampff*
14:45	[624] **Evidence of self-sealing in wellbore cement under geologic CO2 storage conditions by micro-CT, SEM and Raman observations** *Yan WANG, Liwei Zhang, Manguang Gan*
15:00	[423] **Attention-Res-UNet-based WGAN-GP Network to Boost Digital Rock Image Resolution** *Xupeng He, Yiteng Li, Zhen Zhang, Marwa AlSinan, hyung kwak, Hussein Hoteit*
15:15	[366] **3D observation of (nano)-cellulose fibers network by multiscale imaging techniques: from nanometer to millimeter scale.** *NELLY PADILLA BELLO, Christian Geindreau, Sabine Rolland du Roscoat, Mathilde Rota, Hélène Curmi*

Invited Parallel Lecture 5

Pentland Auditorium *15:35 - 16:10*
Chair: *Michael Celia* (Princeton University)

Learn about InterPore Foundation *15:35 - 15:40*

Behnam Jafarpour *15:40 - 16:10*

University of Southern California, *USA*

Deep Learning for Parameterization and Calibration of Subsurface Flow Models

Calibration of subsurface flow models often leads to underdetermined inverse problems, where limited data is used to estimate spatially distributed hydraulic properties of geologic formations at high resolution. The problem is usually solved by using a given model of geologic continuity to constrain the expected distribution and connectivity patterns of the solution. For non-Gaussian problems, imposing the specified model of continuity is not trivial. Low-dimensional parameterization methods are commonly adopted to improve problem ill-posedness and to capture and preserve the expected spatial connectivity patterns in the solution. Deep learning offers a new perspective for low-dimensional parameterization and calibration of complex high-dimensional flow models. Using training data with diverse and complex spatial connectivity patterns, deep learning models can learn a nonlinear mapping from high-dimensional spatial distribution of properties onto a low-dimensional latent space that provides a compact description of model calibration parameters. The resulting latent space can be used to parameterize the inverse problem and to facilitate the search for solutions that are geologically plausible and that reproduce the observed flow response data. More complex architectures can be developed by jointly constructing low-dimensional parameter and data latent spaces, and a direct inverse mapping from the data latent space to the parameter latent space, to perform regression. Alternative parameterization, inversion and data assimilation formulations that exploit latent space representations of model parameters and data are presented and discussed with examples to illustrate the performance of these methods.

WEDNESDAY, 24 MAY 2023

Invited Parallel Lecture 6

Moorfoot/Kilsyth *15:35 - 16:10*
Chair: *Iain Young (KAUST)*

Hiden Isochema sorption analyzers *15:35 - 15:40*

Lidietta Giorno *15:40 - 16:10*

Institute on Membrane Technology (CNR-ITM), *Italy*

Porous biohybrid multifunctional membranes for biosensors and bioremediation

Synthetic membranes are among the most effective technology in separation, fractionation, concentration, and purification. Their nanostructured pores have demonstrated their unique role also in implementing processes such as catalysis, and molecular recognition. Engineering the chemistry of the material, the structure of the pores, and the process conditions permits an extension of the areas of application of membranes. The combination of porous and mesoporous membranes with biomolecules leads to the development of artificial membranes with biofunctional properties. Biorecognition and bioconversion confined in micro and nanoscale compartments are emerging as important properties in the development of membrane-based biosensing and biocatalytic tools. For example, the trace presence of recalcitrant micropollutants (such as pesticides, antibiotics, hormones, etc.) in the environment causes chronic exposure that represents a threat to health and socio-economic wellness. The availability of technologies able to detect and eliminate trace micropollutants appears to be crucial.
The lecture will discuss the development of biofunctionalized porous membranes and their ability in intercepting traces of a model pesticide (such as paraoxon). The capability of membranes functionalized with an enzyme (phosphotriesterase) to fully degrade the pesticide will be also illustrated. Superparamagnetic plasmonic nanoparticles (core-shell iron-gold nanoparticles) conjugated with enzymes are orderly arranged in porous polymeric frameworks able to accumulate the trace contaminant and enhance the interaction with the biochemical receptor. The role of membrane material, pore size, structure, morphology, topography, thickness, and surface energy on the mass transport, molecular interaction, and stabilization of the biomolecules will be outlined.

DO YOU KNOW....EDINBURGH?

The Three Bridges

Sweeping over the Firth of Forth, the three Forth bridges span three centuries and connect Scotland's capital to the Fife region directly to its north. The Forth Rail Bridge was built in 1890 in the wake of the Tay Bridge disaster and was designed to project strength and stability to the travelling Victorians. A designated UNESCO World Heritage Site, it is one of the most recognizable structures in the world and is famous for taking so long to paint that once you have finished one end you have to start again. Although, its restoration gave it a new longer-lasting paint job – still in the same iconic red color. Built in 1964, the Forth Road Bridge was the longest outside the United States at the time, constructed to accommodate the rising number of private cars. The bracing between the tower in the shape of St Andrews Cross adds to its stylish appearance. A new road bridge was built in 2017 as part of a major road upgrade to accommodate modern traffic volumes. Known as the Queensferry Crossing, it is currently the longest three-tower, cable-stayed bridge in the world. The Forth Road Bridge is now open to cyclists, pedestrians and buses. The stunning panorama that the three bridges offer is well worth the short journey from Edinburgh to the quaint waterside village of South Queensferry (30 minutes by train).

Coffee Break & Exhibition

Cromdale Hall 16:10 - 17:40

Coffee, beer & soft drinks are available in the poster and exhibition hall. Come grab a snack, network with other attendees, visit the exhibition booths and discuss the posters on display.

Poster Session IV

Cromdale Hall 16:10 - 17:40

Poster board	
51	[387] **Improving Colloidal Silica Grout's Performance as an Injectable Sub-surface Barrier and Soil Stabiliser for Nuclear Decommissioning** *David Morrison, Matteo Pedrotti, Rebecca Lunn, James Graham, Emily Draper*
52	[402] **Pore-scale investigation of gas mixing, brine salinity, and salt type influence on the dynamic contact angle using Microfluidics for underground CO2 sequestration** *Amer Alanazi, Abdullah Bukhamsin, Saleh Bawazer, Muhammad Ali, Hussein Hoteit*
53	[421] **Assessment of hydrogen uptake ability of clay-rich caprocks** *Mohammad Masoudi, Mohammad Nooraiepour, Helge Hellevang*
54	[424] **Rock thermal properties prediction based on acoustic wave velocity in geothermal reservoirs** *Parvin Kolah Kaj, Phil Vardon, Hemmo Abels, Auke Barnhoorn*
55	[1031] **Design of Functionalized Molecules and Polymers (FMP) for Improving the Containment of Subsurface CO2** *Sina Omrani, Vahid Niasar*
56	[807] **Discrete fluid model for drying of capillary porous media with evolving microstructure** *Jing Chen, Xiang Lu, Evangelos Tsotsas, Abdolreza Kharaghani*

WEDNESDAY, 24 MAY 2023

Poster Session IV, cont.

Cromdale Hall 16:10 - 17:40

Poster board	
57	[897] **Molecular Mechanisms Underlying The Treatment of Archaeological Wood Cell Wall Composite with Polyethylene Glycol: A Hybrid Monte Carlo and Molecular Dynamics Study** *Ali Shomali, chi zhang, Wenqiang Liu, Benoit Coasne, Eleanor J. Schofield, Dominique Derome, Jan Carmeliet*
58	[933] **The impact of heterogeneity in the pore structure of a laboratory sedimented clay sample when measuring swelling anisotropy** *Irene Rocchi, Leonardo Teixeira Pinto Meireles*
59	[1074] **Swelling of oak wood in water-ethanol mixtures : impact of the liquid composition on the material deformation.** *Cédric Dussaut, Julien Colin, Joel Casalinho, François Litoux-Desrues, Rémi Teissier du Cros, Charlotte Abadie, Patrick Perré*
60	[653] **Exploiting induced carbonate precipitation to improve reservoir storage integrity and geothermal system efficiency** *Philip Salter, James Minto, Katherine Dobson, Jay Warnett*
61	[754] **Experimental study of microbial effects on anhydrite and cement during hydrogen storage in salt caverns.** *Joyce Schmatz, Garri Gaus, Fabien Georget, Jop Klaver, Saeed Khajooie, Hendrik Ballerstedt*
62	[214] **Carbon sequestration in porous materials: Uniform CO2 flooding and reaction front** *Roi Roded, Manolis Veveakis, Laura Dalton*
63	[312] **Impact of structural heterogeneity on fluid phase patterns in two-phase flow through two-dimensional porous micromodels** *Oshri Borgman, Francesco Gomez, Tanguy Le Borgne, Yves Méheust*
64	[414] **Water permeability reduction associated with injection of oil-water emulsions and microcapsule suspensions in Bentheimer sandstone** *Paulo Hoyer, Lisbeth Manchego, Jorge Avendaño, Marcio Carvalho*

Poster Session IV, cont.

Cromdale Hall 16:10 - 17:40

Poster board	
65	[730] **Water transport in n-alkane phases through diffusion and emulsion: insights into oil remobilization from a pore-scale perspective** *LIFEI YAN*
66	[351] **Dynamic pore network modeling of imbibition in porous media with corner film flow** *Jianlin Zhao, Guangqing Zhang, Qinjun Kang, Dominique Derome, Jan Carmeliet*
67	[465] **Experimental Investigation of Wettability Alteration by Modified Salinity Water in Chalk Reservoirs** *Rasoul Mokhtari, Ali Talaei, Louise Post Lange, Sofie Nørgreen, Amanda Skydt, Isabelle Moraes Amorim Viegas, Karen Feilberg*
68	[538] **Multi-Scale Assessment of Surfactant-Assisted Spontaneous Imbibition** *Jamal Alaamri, Viswasanthi Chandra, Hussein Hoteit*
69	[546] **Enhancing Oil Recovery from Carbonate Reservoirs with Nanoparticle-Assisted Foams** *Ayomikun Bello, Anastasia Ivanova, Alexey Cheremisin*
70	[574] **Wettability alteration of microfluidic devices using plasma and its influence on trapping mechanisms in geological reservoirs** *Viktor Gredičak, Claire Douat, Aneta Slodczyk, Lionel Mercury, Sophie Roman*
71	[924] **Effect of Water on the Methane Adsorption on the Na-Montmorillonite Surface: Molecular Dynamics Study** *Olga Solovyeva, Vasily Pisarev, Grigory Smirnov*
72	[479] **RepoTREND – A Program Package for Safety Analysis of a Final Repository for Radioactive Waste** *Tatiana Reiche*

WEDNESDAY, 24 MAY 2023

Poster Session IV, cont.

Cromdale Hall 16:10 - 17:40

Poster board	
73	[750] **Structural controls on the development of karst environments: A multi-scale experimental investigation** *Théo Briolet, Elisabeth BEMER, Olivier SISSMANN, Jérôme FORTIN*
74	[760] **Numerical investigation of chaotic advection in porous media at the Pore and Darcy scales** *Stefano Ascione, Tanguy Le Borgne, Daniel Lester, Guillem Sole Mari, Joris Heyman*
75	[812] **Underground hydrogen storage in deep aquifers with CO2 as a cushion gas** *Sabrine Ben Rhouma, Daneil Broseta, Roland MASSON, Farid SMAI, Fernanda De Mesquita Lobo Veloso, alexandre dossantos, Pierre Chiquet*
76	[944] **High-resolution Darcy-Brinkman simulation of wormhole growth based on X-CT data.** *Michał Dzikowski, Rishabh P. Sharma, Piotr Szymczak*
77	[1088] **Alquimia: A generic interface to biogeochemical codes** *Sergi Molins, Benjamin Andre, Glenn Hammond, Jeffrey Jonhson, Benjamin Sulman, Konstantin Lipnikov, Marcus Day, James Beisman, Daniil Svyatskiy, Carl Steefel, John David Moulton*
78	[1091] **Model for the simulation of reaction-mixing processes at boundary layers** *Alisdair Soppitt, Mohaddeseh Mousavi Nezhad, Thomas Hudson*
79	[245] **Permeability Contribution Estimation of Different Pore Structures in the Heterogeneous Porous Media Using Image-Based Rock Typing** *Yuzhu Wang*
80	[390] **Novel multi-scale pore network modeling approach that combines high-resolution pore volume reconstruction and super-resolution segmentation** *Xin Liu, Viswasanthi Chandra, Volker Vahrenkamp*

Poster Session IV, cont.

Cromdale Hall 16:10 - 17:40

Poster board	
81	[434] **Semi-Analytical Model to Predict Dynamic Capillary Pressure - Water Saturation Relationships for Multiphase Flows in Porous-Media** *Harris Rabbani, Saideep Pavuluri*
82	[449] **Potential Applications of Quantum Computing in Pore Scale Modeling** *Daniel Rathmaier, Luis E. Zerpa*
83	[456] **Equivalent permeability estimation of vugular porous media micromodels** *Monique Dali, Jesús Fernández, Frederico Gomes, Jorge Avendaño, Marcio Carvalho*
84	[570] **Symmetrizing multiphase flow equations for improved accuracy** *Reza Haghanihasanabadi, Hamidreza erfaniGahrooei, James McClure, eirik flekkøy, Carl Fredrik Berg*
85	[577] **Multiscale network modeling of flow in carbonate rocks with microporosity** *Asli S. Gundogar, Luke Giudici, Martin Blunt, Branko Bijeljic*
86	[619] **Evaluation of nanoparticle-based fluids with regard to the enhanced oil recovery (EOR) efficiency and energy cost of their synthesis** *Anastasia Strekla, Christina Ntente, Maria Theodoropoulou, Zacharoula Iatridi, Georgios Bokias, Christos Tsakiroglou*
87	[652] **Micro-Scale Simulation and Characterization of Adsorption-Diffusion Behaviors of Nanoparticles onto Mobile Oil/Water Interface** *Can Ke, Yuan Bin, Yue Li*
88	[1056] **Comparing 2D micromodel patterns for pore-scale Underground Storage studies** *Alice Massimiani, Filippo Panini, Dario Viberti, Simone Luigi Marasso, Nicolò Vasile, Quaglio Marzia, Christian Coti, Donatella Barbieri, Francesca Verga, Pirri Fabrizio*

WEDNESDAY, 24 MAY 2023

Poster Session IV, cont.

Cromdale Hall 16:10 - 17:40

Poster board	
90	[673] **Forward and Inverse Modeling of Nonisothermal Multiphase Poromechanics using Physics-informed Neural Networks (PINNs)** *Ehsan Haghighat, Danial Amini, Ruben Juanes*
91	[862] **Geometric Characterizations for the Prediction of Electrical Properties in Porous Media** *Bernard Chang, Rodolfo Victor, Masa Prodanovic*
92	[1021] **Asymptotic Homogenization - Modeling the charging behavior of Li-ion batteries** *Giu Lombardo, Wang Yuanzhen, Ulrich Nieken*

WALK TO ARTHUR'S SEAT

Wednesday, 18:00

Meet in Strathblane Hall

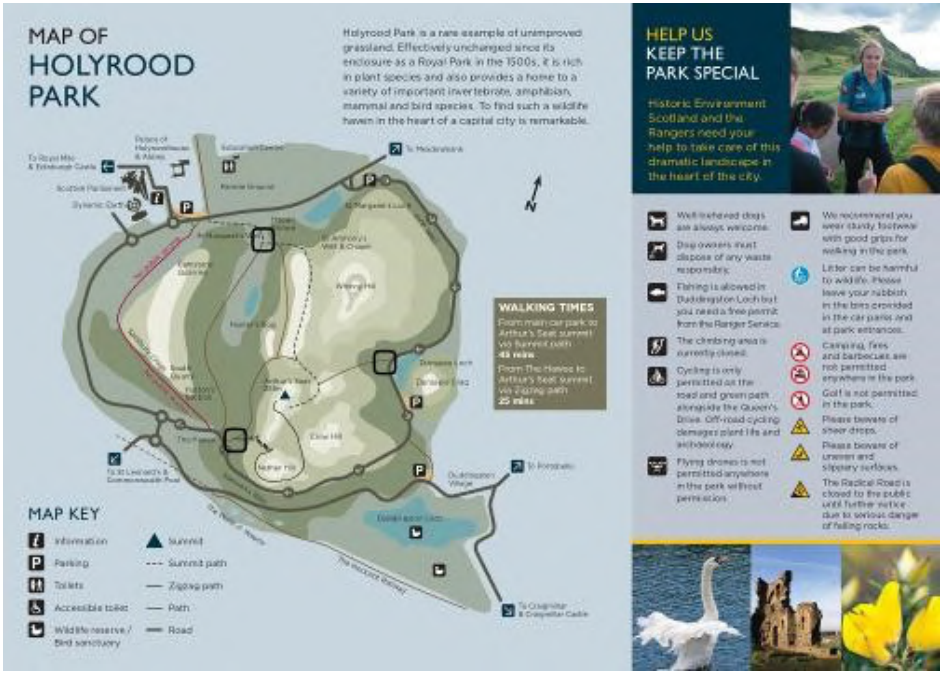
Join us for the walk to Arthur's Seat. Arthur's Seat is an ancient volcano which is the main peak of the group of hills in Edinburgh which form most of Holyrood Park, described by Robert Louis Stevenson as "a hill for magnitude, a mountain in virtue of its bold design."

The walk to the top is approximately 1 hour and 15 minutes. The return to Old Town Edinburgh is approximately 30 minutes. This event is free and open to all attendees.

We plan to take the "Summit Path" marked as dashed line on the map below.

Please note: Sturdy footwear with good grips for walking in the park is recommended. While we are hoping for a rain-free day, you may also want to bring a rain-jacket along; due to the potential for high winds in Scotland, an umbrella is not advised.

Disclaimer: Participation in the walk is entirely at the participant's own risk. The organizers of the event do not assume any responsibility or liability for any injury, loss, damage, or accident that may occur during the course of the event.

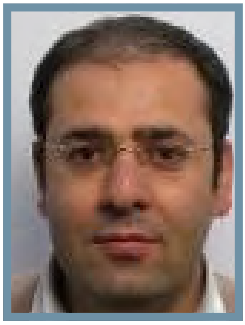


Map provided courtesy of Holyrood Park Ranger Service.

Invited Parallel Lecture 7

Pentland Auditorium *8:30 - 9:05*

Chair: *Jun Yao (*China University of Petroleum)



Rouhi Farajzadeh *8:30 - 9:00*

TU Delft, *The Netherlands*

Thermodynamic efficiency/limit of subsurface energy production/storage systems

To mitigate the negative impacts of increasing CO2 concentrations in the atmosphere on climate change complementary decision tools should be considered when selecting or evaluating the performance of certain (sub-surface) energy production and/or storage systems. Here we explain the framework in which the subsurface energy system could be analyzed using the exergy concept based on the Second Law of Thermodynamics. The analysis considers the energy requirement of different stages in the life cycle of the considered system, which can later be used to quantify its CO2 emission. The exergy analysis provides valuable information on comparing different energy routes in terms of their end-to-end efficiency and/or their CO2 intensity (gr-CO2/MJ). We show application of the methodology for different hydrocarbon production systems, underground hydrogen storage, and CO2 capture and storage. We assert that during energy transition time the focus should be on minimizing CO2 intensity of the selected systems, regardless of its origin.

Learn about TESCAN *9:00 - 9:05*

THURSDAY, 25 MAY 2023

Invited Parallel Lecture 8

Moorfoot/Kilsyth *8:30 - 9:05*

Chair: *Ivan Yotov* (University of Pittsburgh)

Adriana Paluszny *8:30 - 9:00*

Imperial College London, *UK*

Finite element modelling of the growth and flow properties of multiple-scale three-dimensional fracture networks

The generation and growth of multiple three-dimensional fractures, and fluid flow through the resultant fractured rock mass, is modelled by solving the displacement and flow equations numerically, using the finite element method. The approach uses the Imperial College Geomechanics Toolkit, an in-house C++ 3D simulator that captures coupled thermo-poro-elastic deformation and damage accumulation, while accounting for variable fracture apertures and local transmissivities on the fracture surface, which evolve as a function of deformation. Simulations are able to capture fracture growth at different scales, and model fracture nucleation based on the evaluation of a local damage model. Quasi-static fracture growth is simulated for a number of different stress regimes, making use of a new geometric representation of fractures, based on a novel periodic quadratic polynomial spatial B-spline approach. Surfaces are formed by lofting tip curves during fracture growth, resulting in a low-cost, high-resolution approach. Meshing of the domain uses quadratic quadrilaterals and hexahedra, as opposed to triangles and tetrahedra. The generated fractures are generally non-planar, due to the varying crack-tip stress intensity factors created by stress field interactions between neighboring fractures. Realistic three-dimensional fracture patterns emerge from the simulations, due to nucleation, growth, interaction and intersection of fractures at several scales. Datasets with thousands of geomechanically interacting discrete fractures at different scales will be presented. Fluid flow through the generated fractured rock mass exhibits interesting channeling effects, which are strongly influenced by the stress regime.

Learn about Surface Measurement Systems *9:00 - 9:05*

Oral presentations: Parallel sessions 4.1

9:15 - 10:45

MS01: Porous Media for a Green World: Energy & Climate - *Part 9*

Tinto

Chairs: *Anna Herring & William Rossen*

9:15	[608] **Multi-scale and dynamic imaging of shales and mudstone: increasing understanding of sealing ability for sub-surface storage** *Lin Ma, Kevin Taylor*
9:30	[870] **Microfluidic Study of CO2 Dissolution Dynamics under Geological Sequestration Conditions** *Wei Yu, Jack H.Y. Lo, Xianmin Zhou*
9:45	[887] **In Situ Imaging of Dynamic Processes in Chalk** *Peter Winkel Rasmussen, Benaiah Anabaraonye, Nico Bovet, Anders Nymark Christensen*
10:00	[937] **Mineral Carbonation Sensitivity to Hydrogeologic Heterogeneity of Basaltic Aquifers** *Adedapo Awolayo, Benjamin Tutolo, Rachel Lauer, Kong Xiang-Zhao*
10:15	[946] **Time-lapse imaging of fine particle movement in porous materials** *chenzi shi, Lin Ma, Kevin Taylor*
10:30	[432] **Properties of restructuring porous media for thermochemical energy storage** *Marie Gollsch, Torben Prill, Thomas Jahnke, Marc Linder*

THURSDAY, 25 MAY 2023

Oral presentations: Parallel sessions 4.1, cont.

9:15 - 10:45

MS23: Special Session in honor of Signe Kjelstrup - *Part 1*

Carrick

Chairs: *Bjørn Hafskjold & Dick Bedeaux*

9:15	[527] **Ultrasonic Study of Water Adsorbed in Nanoporous Glasses** *Jason Ogbebor, John Valenza, Peter Ravikovitch, Ashoka Karunarathne, Boris Gurevich, Maxim Lebedev, Alexei Khalizov, Gennady Gor*
9:30	[1009] **A (dual) network model for heat transfer in coupled porous media free flow systems** *Rainer Helmig, Timo Koch, Martin Schneider, Anna Mareike Kostelecky, Helge Dahle, Johannes Müller, Bernhard Weigand*
9:45	[1008] **Colloidal particles adsorption fluctuations: experimental and kirkwood buff integrals approaches** *Jean-Marc Simon, Isabelle Pochard*
10:00	[1022] **Entropic origin of the deviations from Darcy's law in porous media** *Andres Arango-Restrepo, J. Miguel Rubi*
10:15	[645] **Local Equilibrium in Liquid Phase Shock Waves** *Tage W. Maltby, Bjorn Hafskjold, Dick Bedeaux, Signe Kjelstrup, Øivind Wilhelmsen*

Oral presentations: Parallel sessions 4.1, cont.

9:15 - 10:45

MS12: Advances in computational and experimental poromechanics - *Part 2*

Lammermuir 1

Chairs: *Sebastian Geiger*

9:15	[205] **Simulation of the inelastic deformations of porous reservoirs under cyclic loading relevant for underground hydrogen storage** *Kishan Ramesh Kumar, Herminio Tasinafo Honorio, Hadi Hajibeygi*
9:30	[300] **A Bounding Surface Viscoplasticity Model for Creep and Strain-Rate-Dependent Behaviour of Soils** *Babak Shahbodagh, Nasser Khalili*
9:45	[341] **Coupling mechanism of sorption and deformation in amorphous cellulose with hierarchical porous structure** *Lingji HUA, Ali Shomali, Chi Zhang, Dominique Derome, Jan Carmeliet*
10:00	[267] **Polytopal Discontinuos Galerkin discretization of the fully-coupled thermo-poroelastic problem** *Michele Botti, Paola Francesca Antonietti, Stefano Bonetti*
10:15	[600] **Seismic wave attenuation and dispersion due to two-phase fluid saturation: Laboratory measurements and numerical simulations based on X-Ray CT** *Samuel Chapman, Jan V. M. Borgomano, Beatriz Quintal, Sally Benson, Jerome Fortin*
10:30	[852] **Simulation of cyclic storage of hydrogen in salt caverns based on laboratory-benchmarked modeling of creep** *Herminio Tasinafo Honorio, Maartje Houben, Arjan van der Linden, Kevin Bisdom, Karin de Borst, Lambertus J Sluys, Hadi Hajibeygi*

THURSDAY, 25 MAY 2023

Oral presentations: Parallel sessions 4.1, cont.
9:15 - 10:45

MS13: Fluids in Nanoporous Media - *Part 2*
Lammermuir 2
Chairs: *Bin Pan & Elizabeth Barsotti*

9:15	[1007] **Structure and adsorption mechanisms of hydrogen gas on water-saturated montmorillonite clay: A molecular dynamics study** *Sylvia Mutisya, Andrey Kalinichev*
9:30	[731] **Confined fluids studied by total neutron scattering** *Marta Falkowska, Daniel Bowron, Tristan Youngs, Chris Hardacre*
9:45	[746] **Dynamics and Phase behaviour of Ionic Liquid Crystal confined in Nanoporous Alumina** *Mohamed Aejaz Kolmangadi, Andreas Schönhals, Patrick Huber*
10:00	[64] **Water diffusion in cellulose nanopores** *Yuliang Zou, Benjamin Maillet, Philippe Coussot*
10:15	[405] **Surface interactions and reactions strongly impact ion adsorption and electrokinetic transport** *Remco Hartkamp*
10:30	[859] **Temperature-Dependent Behavior of Bicontinuous Microemulsions in Pores** *René Haverkamp, Margarethe Dahl, Stefan Wellert, Thomas Hellweg*

Oral presentations: Parallel sessions 4.1, cont.

9:15 - 10:45

MS06-A: Physics of multiphase flow in diverse porous media - *Part 6*

Monteith

Chairs: *Ryan Armstrong & Senyou An*

9:15	[779] **Competitive adsorption of CO$_2$ and CH$_4$ in functionalized amorphous-silica nanopores** *Mattia Turchi, Ivan Lunati, Sandra Galmarini*
9:30	[802] **Bridging the continuum and discrete models developed to simulate solute transport and distribution in drying porous media** *Abdolreza Kharaghani, Jing Chen*
9:45	[797] **Dewatering and consolidation of clay slurries** *Ismail Myouri, Angela Casarella, Leo Pel, Claire Chassagne*
10:00	[880] **Effects of molecular details on two-phase flows through nanopores** *Petter Johansson, Guillaume Galliero, Romain Vermorel*
10:15	[920] **Melting Kinetics of Permafrost under Overlaying Saline Water** *Yumin Wang, Wei Yang, Ke Xu*
10:30	[994] **Droplets at Liquid-Fluid Interfaces: Pressure Field and Coalescence** *JOSE LUIZ DAVALOS MONTEIRO, Qi Liu, J. Carlos Santamarina*

Oral presentations: Parallel sessions 4.1, cont.

9:15 - 10:45

MS07: Mathematical and numerical methods for multi-scale multi -physics, nonlinear coupled processes - *Part 3*

Harris

Chairs: *Jacob Both & Nadja Ray*

9:15	[899] **A linear iterative scheme for reactive flow in a porous medium** *Iuliu Sorin Pop, Wietse Vaes, Fred Vermolen*
9:30	[43] **Hyperbolic Systems for Strongly Coupled Multi-Phase Flow and Transport in the Sub-Surface** *Patrick Jenny, Rasim Hasanzade, Hamdi Tchelepi*
9:45	[633] **A Lagrange multiplier method for the fully dynamic Navier -Stokes - Biot system** *Ivan Yotov, Xing Wang*
10:00	[626] **Sub-grid Modeling in a Particle-based Approach: Regularization of Non-linear Hyperbolic Conservation Law** *Ranit Monga, Daniel Meyer, Patrick Jenny*
10:15	[693] **Multiscale Extended Finite Element Method for Simulation of Fractured Geological Formation with Propagating Fractures** *Fanxiang Xu, Lambertus J Sluys, Hadi Hajibeygi*
10:30	[247] **3D modeling of macro-segregation and formation of freckles in solidification based on the fully decoupled enthalpy-porosity method** *Xiaoyu Feng, Huangxin Chen, Shuyu Sun*

Oral presentations: Parallel sessions 4.1, cont.

9:15 - 10:45

MS09: Pore-scale modelling - *Part 6*

Lowther

Chairs: *Stephane Zaleski & Karsten Thompson*

9:15	[759] **Meshless Lattice Boltzmann Method for pore-scale porous media flow and parameters calculation** *Dawid Strzelczyk, Miha Rot*
9:30	[783] **Volume of Fluid based study of the three phase dynamic contact line in the wetting of a thin channel.** *Yash Kulkarni, Tomas Fullana, Stéphane Zaleski, Stephane Popinet, Mathis Fricke*
9:45	[788] **Discrete Element Method modelling of non-active clays** *Arianna Pagano, Vanessa Magnanimo, Alessandro Tarantino*
10:00	[796] **CFD simulation of particle capture in open-cell foams: filtration efficiency and comparison with granular beds** *Enrico Agostini, Marion Servel, Yacine Haroun, Maxime Moreaud, Frederic Augier, Gianluca Boccardo, Daniele Marchisio*
10:15	[828] **Pore-network modeling of gas hydrate dissociation: impact on pressure response and gas transport** *Chico Sambo, Karsten Thompson, Olufemi Olorode,*
10:30	[842] **Pore-scale modelling and analysis of multiphase flow in gas diffusion layers** *Branko Bijeljic, Jifei Zhao, Martin Blunt, Min Li, Sajjad Foroughi*

THURSDAY, 25 MAY 2023

Oral presentations: Parallel sessions 4.1, cont.

9:15 - 10:45

MS10: Advances in imaging porous media: techniques, software and case studies - *Part 3*

Ochil

Chairs: *Marijn Boone & Martin Blunt*

9:15	[191] **Using 4D-Imaging to describe the impact of the microstructure on sublimation front patterns** *Sebastian Gruber, Maximilian Thomik, Frederik Coppens, Nicole Vorhauer-Huget, Evangelos Tsotsas, Petra Foerst*
9:30	[361] **Dynamics of water films during wetting and drying cycles in porous media** *Gijs Wensink, Maja Ruecker, Veerle Cnudde, Laurenz Schröer*
9:45	[442] **Spatio-temporally Resolved Dynamical Transitions in Flow of Pickering Emulsions through Porous Media** *Milana Trifkovic, Steven Bryant, Aigerim Meimanova, Leonardo Martin -Alarcon, Guofeng Yang, Brandy Kinkead, Aleksandra Govedarica*
10:00	[480] **Water dynamics during gas fed CO2-electrolysis revealed by 4D X-ray imaging** *Robert Fischer, Matthieu Dessiex, Federica Marone, Felix N. Büchi*
10:15	[705] **Use of 4D tomography to track the evolving geometry and flow patterns in dissolving rocks** *Piotr Szymczak, Max P. Cooper, Rishabh P. Sharma, Andrzej Radlinski, Tomasz P. Blach, Katarzyna Drabik, Alessandro Tengattini*
10:30	[873] **Analysing salt precipitation-damage coupling in limestone with 4D X-ray tomographic imaging** *Syrine BEN ELHADJ HAMIDA, Marijn Boone, Veerle Cnudde, Peter Moonen, Hannelore Derluyn*

DO YOU KNOW....EDINBURGH?

New Lanark and the Falls of Clyde

Situated 30 miles south-west of Edinburgh, New Lanard is one of Scotland's 6 UNESCO World Heritage Sites. Founded in 1785 with a focus on education and welfare of the mill workers, New Lanark became a model for industrial communities that was to spread across the world in the 19th and 20th centuries. The heart of New Lanark is a living and working village which welcome visitors from all over the world. Learn and explore the 18th century cotton-spinning village with historical buildings including the first workplace nursery school in the world. New Lanark is also the gateway to the majestic Falls of Clyde where you will find a woodland walk through breathtaking scenery, stunning waterfalls and the Clyde Walkway. Look out for wildlife, and you may catch a glimpse of kingfishers, otters, deer and maybe walk in the footsteps of William Wallace himself.

"Falls Of Clyde (Corra Linn)" by Bert Kaufmann is licensed under CC BY 2.0. To view a copy of this license, visit https://creativecommons.org/licenses/by/2.0/?ref=openverse.

Coffee Break & Exhibition

Cromdale Hall 10:45 - 12:15

Refreshments are available in the poster and exhibition hall. Come grab a snack, network with other attendees, visit the exhibition booths and discuss the posters on display.

Poster Session V

Cromdale Hall 10:45 - 12:15

Poster board	
1	[469] **Nano-scale imaging and modelling of gas transport in clay-rich mudstones** *Xin Zhong, Lin Ma, Sarah Haigh, Andrew Masters, Kevin Taylor*
2	[541] **Distributed sensing for monitoring greenhouse gas loading to the atmosphere through disturbed soil: Intermediate-scale testing** *Tissa Illangasekare, Ana Ilie, Yaobin Yang, Kenichi Soga, Richard Whalley, Adriana Torres-Ballesteros*
3	[545] **Investigating calcite dissolution and relative effects on Underground Hydrogen Storage (UHS) through pore-scale reactive transport model and reservoir simulation** *Kunning Tang, Zhenkai (Josh) Bo*
4	[563] **Towards the prediction of caprock porosity and permeability for CO2 storage seal integrity assessment** *Wan Muhammad Luqman Sazali, Andreas Busch, Jingsheng Ma, Jim Buckman*
5	[629] **Low cost 3D printing of electrically conductive porous media for gas diffusion layers** *Yann Dumay, Volker Paul Schulz, Eric Chadwick*
6	[676] **Modelling Long-Term Thermal Energy Storage in Water-Gravel-Filled Artificial Basin Systems** *Christoph Bott, Christoph Trinkl, Mathias Ehrenwirth, Abdulrahman Dahash, Peter Bayer*

THURSDAY, 25 MAY 2023

Poster Session V, cont.

Cromdale Hall 10:45 - 12:15

Poster board	
7	[684] **Experimental study on effect of cyclic loading on deformation and AE characteristics of sandstone: Relevant for energy storage** *Milad Naderloo, Edgar Hernandez, Kishan Ramesh Kumar, Auke Barnhoorn, Hadi Hajibeygi*
8	[702] **Pore-scale hysteresis and Relative Permeabilities in Edwards Brown Dolomite** *Nihal Darraj, Sam Krevor*
9	[765] **Pore-scale imaging and analysis of surfactant flooding** *Hussain Alzahrani, Branko Bijeljic, Martin Blunt*
10	[771] **Colloidosome-Transported Chemical Carbonate Precipitation (CTCCP): A Novel, Low-Emission Grouting Strategy for Cracks and Porous Media** *Jack Roden*
11	[1060] **On the use of tortuosity for modelling Li-ion battery separators** *Isaac Paten, Martin Petitfrere, Olivier Liot, Céline Merlet, Romain De Loubens, Michel Quintard, Yohan Davit*
12	[127] **Discontinuous Phase Flow in Porous Media: A Pore-scale Approach** *Gloire Imani, Lei Zhang, Hai Sun*
13	[348] **Simulation of transition flows and phase changes in porous media using modified equations of state to obtain the correct surface tension** *Javier Fernández-Fidalgo, Luis Cueto-Felgueroso, Luis Ramírez, Abel Martínez, Xesús Nogueira*
14	[386] **Multiscale Integration of Discrete Fracture Network and Pore Network Modes Focused on the Pore-Fracture Interface** *Ciprian Panaitescu, Kejian Wu, Yukie Tanino, ANDREW STARKEY*

Poster Session V, cont.

Cromdale Hall 10:45 - 12:15

Poster board	
15	[453] **Evaluation of foam stability in bulk and core-scale with CO2 -rich gas mixture and zwitterionic surfactants** *Leandro Freitas Lopes, Aurora Pérez, Juliana Maria da Fonseca Façanha*
16	[502] **Micromodel porous network with heterogeneous wettability** *Camille BRIGODIOT, Elliot SPEIRS, nicolas PANNACCI, Cedric GUYON, Michael TATOULIAN*
17	[534] **Atomistic Insights into the Droplet Size Evolution during Self-Microemulsification** *Yuequn Fu*
18	[649] **Near well bore formation damage by produced water reinjection** *Maksim Kurbasov, Karen Feilberg*
19	[93] **Geometric confinement stabilizes fluid invasion during imbibition in microfluidic porous media** *Wenhai Lei, Lu Xukang, Gong Wenbo, Wang Moran*
20	[675] **Pore size distribution and permeability improvement estimation of porous rocks: a comparison of image-based methods and experimental NMR measurements** *Ricardo Leiderman, André Maués Brabo Pereira, Jefferson Filgueiras, André Souza, Rodrigo Bagueira, Francisco Benavides*
21	[683] **Post-breakthrough finger evolution in unstable growth processes** *Stanisław Żukowski, Annemiek Johanna Maria Cornelissen, Stéphane Douady, Piotr Szymczak*
22	[695] **Incorporating Bubble Evolution and Transport in Constitutive Relationships for Quasi- and non-Equilibrium two-Phase Flo** *Douglas Meisenheimer, Dorthe Wildenschild*
23	[562] **Viscous coupling effect on hydraulic conductance in dynamic pore network model** *Gong Wenbo, Yang Liu, Ju Yang, Wang Moran*

THURSDAY, 25 MAY 2023

Poster Session V, cont.

Cromdale Hall 10:45 - 12:15

Poster board	
24	[613] **Error estimates for the scalar auxiliary variable (SAV) scheme to the Cahn-Hilliard equation** *Shu Ma, Weifeng Qiu, Xiaofeng Yang*
25	[735] **A Quick Approach to Model Fault Leakage during CO2 Storage** *Hariharan Ramachandran, Florian Doster, Sebastian Geiger*
26	[773] **An energy stable SPH method for fluid-solid coupling in geological porous medium** *XINGYU ZHU, Xiuping Wang, Shuyu Sun*
27	[630] **Modeling and simulation of reactive two mineral systems** *Stephan Gärttner, Peter Frolkovic, Peter Knabner, Nadja Ray*
28	[655] **Dissolution-precipitation processes: patterns and product separation** *Tomasz Szawełło, Piotr Szymczak*
29	[680] **A mixed-wet pore network model for electrolyte imbibition in gas diffusion electrodes** *Thorben Mager, Ulrich Nieken*
30	[736] **Inertial effects in porous media flow with OpenFOAM** *Damian Śnieżek, Maciej Matyka*
31	[737] **Predicting Representative Elementary Volume by determining the evolution law of the cone of convergence** *Sijmen Zwarts, Martin Lesueur*
32	[799] **Numerical investigation of impacts of surface wettability on gas hydrate formation in porous media** *Qian Zhang, Yanhui Dong, Deng Hang, Wang Liheng*
33	[330] **Spatial microporosity mapping in meso-scale rock samples by X-Ray Computed Tomography** *Juan C. Roa P., Ronny Pini*

Poster Session V, cont.

Cromdale Hall 10:45 - 12:15

Poster board	
34	[340] **Assessing formation damage in-situ using X-ray computed tomography** *Rory Brittain, Jyoti Phirani, Katherine Dobson*
35	[350] **Electrode Design Booster Using a Statistical Digital Twin** *Mathias Fingerle-Straß, Ilona Glatt, Fabian Biebl, Erik Glatt, Janine Hilden, Sarah Reeb, Roman Buchheit*
36	[394] **Visualization of pore formation during polymerization-induced phase separation** *Sebastian Brosch, Stefano Belardo, John Linkhorst, Matthias Wessling*
37	[515] **Employing GPUs to compute effective properties of porous media from µCT scans in desktop computers** *Pedro Lopes, André Pereira, Ricardo Leiderman*
38	[1047] **A process-based approach to study the effect of microporosity on flow properties in carbonate rock** *Anup Shahi, Kumar Hemant Singh, Ranjith PG*
39	[332] **Controlling hygrothermics of biobased construction material** *Luoyi Yan, Benjamin Maillet, Philippe Coussot, Yuliang Zou*
40	[19] **Transport and evaporation of aqueous co-solvent solutions in thin porous media** *Mirjam G. Wijburg, Shuo Wang, Anton Darhuber*
41	[20] **Transient deformation and swelling of paper by aqueous co-solvent solutions** *Wong Chee-Lok, Shuo Wang, Sajjad Karimnejad, Mirjam G. Wijburg, Hamid Mansouri, Anton Darhuber*
42	[373] **Numerical analysis of axial compression impact on the hydrodynamics of open-cell foams** *Alaa-eddine Ennazii, anthony beaudoin, Aurelian Fatu*

CAREERSATKC.COM

Better Care for a Better World

starts by taking care of you and giving you what you need to succeed. We're dedicated to breaking down barriers to speed up decision making and creating a workplace with relentless focus on our consumers and growing our people, like you.

The proof is in our people – we've been rated as one of Forbes 2022 World's Best Employers, and it's because of the caring people and the amazing culture that brings out the best in everyone.

Led by Purpose.
Driven by You.

For Kimberly-Clark to grow and prosper, we must be an inclusive organization that applies the diverse experiences and passions of its team members to brands that make life better for people all around the world. We actively seek to build a workforce that reflects the experiences of our consumers. When you bring your original thinking to Kimberly-Clark, you fuel the continued success of our enterprise. We are a committed equal opportunity employer and all qualified applicants will receive consideration for employment without regard to race, color, religion, sex, national origin, disability status, protected veteran status, sexual orientation, gender identity, age, pregnancy, genetic information, citizenship status, or any other characteristic protected by law.

THURSDAY, 25 MAY 2023

Energy Transition Event

Lennox Suite 12:15 - 13:55

Chair: *Ann Muggeridge (*Imperial College London)

This event is free and open to all participants. Lunch will be distributed inside the hall prior to the lecture.

Plenary Lecture on Energy Transition

Pentland Auditorium *12:15 - 12:55*

Onno van Kessel

Shell

Energy transition and porous media; an industrial megaproject perspective

The Intergovernmental Panel on Climate Change has made clear that the world needs to undertake rapid and deep transitions in each of the areas that contribute to global greenhouse gas emissions: power, transport, buildings, agriculture and industries like steel, chemicals and cement. To meet the world's energy needs while decarbonising will require accelerating electrification of the economy through renewable power and will also still require the use of liquid and gaseous fuels in sectors that are hard to electrify; at the same time, these fuels will steadily transition from traditional fossil fuels to low- and no-carbon sources as end-use technologies evolve.

Such energy transitions are inevitable over time, but they are and will be proceeding at different paces in different places and in different sectors. Shell's Energy Security and Energy Transformation scenarios identify different national response archetypes and explore how the world energy system could possibly evolve under different sets of assumptions and what the consequences would be for the sources and sinks of anthropogenic carbon (as CO_2) in 2050.

Even among the most difficult-to-decarbonise sectors, decarbonisation is already technically feasible. Yet many current options still face significant compromises preventing them to be the ubiquitous, low-cost backbone of the future energy system. New technologies hence play a crucial role because of their potential to accelerate the energy transition. Hydrogen technology, E-mobility, offshore wind, different forms of carbon capture, renewable and sustainable fuels as well as energy system integration and digital technologies dealing with decentralization – all are major innovation areas in their own right. Viewed through the lens of porous media research at InterPore2023, however, it is advanced energy storage and CO_2 storage which emerge as the areas of greatest interest. For CO_2 storage specifically, geomechanical and thermal modelling as well as monitoring and verification technology are currently seeing major innovation.

When deciding which promising technologies to further develop, demonstrate and deploy, we cannot look at fundamental technical credentials alone. The industrial, geographic and time scales of the energy transition compel us to ask essential questions other than 'is it technically better?' Examples of such questions are: can it be transported? Can it be scaled up 100x or 1000x? Is it resource efficient and circular? Will it acquire all necessary project permits? What will local residents and end-users think? What are the remaining risks and who will bear them? What policy support does it require? In other words: what will it take to turn promising technology into the range of large projects that will ultimately deliver the energy transition at the scale and speed required? Building on experience of industrial-scale energy project development – and using some examples based on integrated carbon capture, transport and storage projects – I will highlight the type of scrutiny and constraints (people, space, materials, equipment, schedule, policies, standards, environmental impact etc.) that typically apply once technology is taken out of the R&D space into the front-end development and execution of megaprojects.

Energy Transition Forum

Lennox Suite 12:55 - 13:55

A panel of experts will engage in a discussion with the participants regarding the current urgent research needs in various energy transition technologies and methodologies.

Join us for this forum, open and free to all participants.

Panel Chair:

Ann Muggeridge
Imperial College London

Panelists:

Onno van Kessel
Shell

Aimy Bazylak
University of Toronto

Michelle Bentham
British Geological Survey

Martin Blunt
Imperial College

Lynn Orr
Stanford University

THURSDAY, 25 MAY 2023

Oral presentations: Parallel sessions 4.2
14:00 - 15:30

MS01: Porous Media for a Green World: Energy & Climate - *Part 10*
Tinto
Chairs: *Brian Ellis & Maartje Boon*

14:00	[114] **Water vapor transport in porous salt hydrate particles in view of energy storage** *Joey Aarts, Stan de Jong, Donkers Pim, Fischer Hartmut, Martina Cotti, Olaf Adan, Henk Huinink*
14:15	[356] **he moisture and temperature evolution in a zeolite heat storage reactor during cycling: an NMR study** *Leo Pel, Jelle Houben*
14:30	[289] **Engineering ordered porous structure with direct additive-manufacturing approach for solar thermochemical fuel production** *Da Xu, Meng Lin*
14:45	[579] **An image-based sphere insertion method for porous media drainage simulations with gravity** *Eric Chadwick, Lukas H. Hammen, Volker Paul Schulz, Aimy Bazylak, Marios Ioannidis, Jeffrey Gostick*
15:00	[701] **Identification and understanding of colloidal destabilization mechanisms in geothermal processes** *Ines Raies, Marc Fleury, Eric Kohler, Béatrice Ledésert*
15:15	[795] **Fracture permeability evolution as a result of geochemical granite alteration in geothermal systems** *Nick Harpers, Jim Buckman, Hannah Menke, Julien Maes, Niko Kampman, Andreas Busch*

Oral presentations: Parallel sessions 4.2, cont.

14:00 - 15:30

MS23: Special Session in honor of Signe Kjelstrup - *Part 2*

Carrick

Chairs: *J. Miguel Rubi & Jean-Marc Simon*

14:00	[251] **Comparison of two optimization approaches in an electrochemical reaction-diffusion system from an entropy generation perspective** *Mehrzad Alizadeh, Patcharawat Charoen-amornkitt, Takahiro Suzuki, Shohji Tsushima*
14:15	[885] **Is salt precipitation an issue during geological storage of hydrogen in saline aquifers? from thermodynamic perspective using PC-SAFT EoS** *Mohammad Masoudi, Elyes Ahmed, Xavier Raynaud, Helge Hellevang*
14:30	[1023] **Ion adsorption at nanoscale interfaces out of equilibrium** *Fernando Bresme*
14:45	[532] **The role of Stern layer ions in ionic transport in porous media** *Claire Chassagne, Remco Hartkamp, Tajana Begović, Johannes Lützenkirchen*
15:00	[1020] **Activity-induced interactions in active systems** *Ignacio Pagonabarraga*

THURSDAY, 25 MAY 2023

Oral presentations: Parallel sessions 4.2, cont.

14:00 - 15:30

MS16: Fluid Interactions with Thin Porous Media

Lammermuir 1

Chairs: *Richmond Cohen & Jens Eller*

14:00	[103] **Vapor and bound water transport in textiles and paper: observation by MRI and modelling** *Yuliang Zou, Benjamin Maillet, Philippe Coussot*
14:15	[185] **Imaging particle transport in thin, porous media using high -speed NMR.** *Olaf Adan, Henk Huinink, ruben nicasy, Bart Erich, Aitor Barquero*
14:30	[380] **A Knowledge-Driven Reduced-Order Model with a data-driven corrector for thin porous media** *Alaa Armiti-Juber, Tim Ricken*
14:45	[528] **Insights into Water Cluster Instabilities in Gas Diffusion Layers of Polymer Electrolyte Fuel Cells** *Tim Dörenkamp, Federica Marone, Mayank Sabharwal, Jens Eller*
15:00	[755] **Towards the Print Excellency via Ink – Media Interactions Ideation** *Nicolae Tomozeiu*

Oral presentations: Parallel sessions 4.2, cont.

14:00 - 15:30

MS13: Fluids in Nanoporous Media - *Part 3*

Lammermuir 2

Chairs: *Bin Pan & Elizabeth Barsotti*

14:00	[700] **Flow enhancement in nano-channels using surface acoustic waves** *Saikat Datta, Gregory Dayao, Rohit Pillai*
14:15	[455] **Bridging adsorption behavior of CH4-CO2 binary systems across scales** *Lingfu Liu, Saman Aryana*
14:30	[922] **Gas and Water Flow Regulations in Remolded Hydrate-hosting Porous Media Based on Non-Darcy Correction of the Pore Network Modeling** *Shanshan Zhou, Kunpeng Xue, Guanbin Liu, Tian Xue, Vahid Niasar, Yu Liu*
14:45	[66] **The phase equilibria of aqueous electrolytes in confinement under Martian condition** *Shaoheng Wang, Michael Steiger*
15:00	[313] **Multiphysical pore-scale modelling of ion transport in variably saturated nanoporous media** *Yuankai Yang, Ravi Patel, Jenna Poonoosamy, Guido Deissmann, Dirk Bosbach*
15:15	[239] **A molecular dynamics study on dissolution and adsorption dynamics of CO2 with H2 impurity in oil reservoir** *Cheng Chen, Hamid Bahai, Jun Xia*

THURSDAY, 25 MAY 2023

Oral presentations: Parallel sessions 4.2, cont.

14:00 - 15:30

MS06-B: Interfacial phenomena across scales - *Part 5*

Monteith

Chairs: *Eduardo Abreu & Ran Holtzman*

14:00	[36] **Exploring the Influence of Interfacial Processes on the Transport and Retention of PFAS in AFFF-Contaminated Soils** *Linda Abriola, Uriel Garza Rubalcava, Craig Klevan, Kurt D. Pennell*
14:15	[396] **Mixing as restart - The role of interface shear in fluid-solid reaction efficiency under chaotic advection** *Tomas Aquino, Tanguy Le Borgne, Joris Heyman*
14:30	[488] **Recent Advances in Modelling Reactive Interfaces in Pore-Scale Simulations** *Cyprien Soulaine, Julien Maes*
14:45	[504] **Direct nanoscale investigation of calcite dissolution kinetics** *Chiara Recalcati, Martina Siena, Monica Riva, Alberto Guadagnini*
15:00	[554] **Adsorption, ion exchange, and surface complexation models for rock-fluid-fluid interactions: an overview and a new implementation in REAKTORO** *Ali Akbar Eftekhari, Allan Leal*
15:15	[721] **Modeling interfaces explicitly with an embedded-boundary finite-volume method across applications** *Sergi Molins, David Trebotich, Carl Steefel*

Oral presentations: Parallel sessions 4.2, cont.

14:00 - 15:30

MS07: Mathematical and numerical methods for multi-scale multi -physics, nonlinear coupled processes - *Part 3*

Harris

Chairs: *Jakub Both & Nadja Ray*

14:00	[8] **The Darcy-type boundary condition on a porous wall** *Igor Pažanin, Eduard Marusic-Paloka*
14:15	[463] **Numerical Simulation of Effective Models for Transport Processes in Deformable Porous Media within Mixed Eulerian/ Lagrangian Framework** *Jonas Knoch, Markus Gahn, Maria Neuss-Radu, Nicolas Neuß*
14:30	[223] **Coupled LBM-DEM model and its application to droplet impact on deformable porous media** *Linlin Fei, Dominique Derome, Jan Carmeliet*
14:45	[482] **Upscaling investigations of dissolution using machine learning and GeoChemFoam** *Hannah Menke, Julien Maes*
15:00	[3] **Multiscale modelling of plant nitrogen use efficiency** *Tiina Roose, Siul Ruiz, Dan McKay Fletcher*
15:15	[508] **Investigations of Degenerate Equations for Fluid Flow and Reactive Transport in Clogging Porous Media** *Nadja Ray, Simon Zech, Raphael Schulz*

THURSDAY, 25 MAY 2023

Oral presentations: Parallel sessions 4.2, cont.

14:00 - 15:30

MS09: Pore-scale modelling - *Part 7*

Lowther

Chairs: *Moran Wang & Ke Xu*

14:00	[850] **Modelling the transport and retention of nanoparticles in a single partially-saturated pore in soil** *Jayaraj J, Seetha N, S. Majid Hassanizadeh*
14:15	[464] **Direct numerical modelling of multiphase flow through reinforced porous media** *Luka Malenica, Zhidong Zhang, Ueli Angst*
14:30	[875] **Multi-scale pore network model for simulation of multi-phase flow in heterogeneous porous media** *Sajjad Foroughi, Branko Bijeljic, Martin Blunt*
14:45	[921] **Multiscale forward modeling of the interplay between carbonate precipitation and porous media transport properties during geological carbon sequestration** *Tianxiao Shen, Shaina Kelly*
15:00	[27] **Pore-scale modeling of pore-clogging by aggregation of particles** *Laurez Maya, Cyprien Soulaine, Philippe Leroy, Laurent ANDRE*
15:15	[806] **Pore network modeling of calcination in single particles with evolving microstructure** *Xiang Lu, Abdolreza Kharaghani*

Oral presentations: Parallel sessions 4.2, cont.

14:00 - 15:30

MS10: Advances in imaging porous media: techniques, software and case studies - *Part 4*

Ochil

Chairs: *Lin Ma & Martin Blunt*

14:00	[59] **Characterization of oilwell cement with Ca-montmorillonite additives modified by supercritical CO2** *Liwei Zhang, KAIYUAN MEI, Yan WANG, Xiaowei Cheng*
14:15	[141] **Integration of SEM Images and NMR Measurements to Characterize Pore Size Distributions in Unconventional Tight Rock Reservoirs** *Paul Hart, Elton Yang, Luisa Crousse*
14:30	[92] **Nano-resolution X-CT 3D Imaging and Permeability Simulation of an Actual Shale Kaolinite** *Anderson Camargo Moreira, Celso Peres Fernandes, Rodrigo Surmas, Iara Frangiotti Mantovani, Lucas Debatin Vieira, Hannes Claes*
14:45	[595] **Multiscale analysis of microporosity of deep marine reservoir rocks using hard X-rays zoom microtomography of synchrotron source** *Daphne Silva Pino, Paola Cunha Ferraz, Allan da Silva Pinto, Larissa Macul Moreno, Bruno Vasco de Paula Carlos, Otávio Moreira Paiano, Eduardo Xavier Miqueles, Rodrigo Surmas, Nathaly Lopes Archilha*
15:00	[775] **Scale-independent rock heterogeneity classifier applied to microtomography images** *Ali Mohamed, Masa Prodanovic*
15:15	[149] **In-situ visualisation of microbial hydrogen consumption using high-resolution PET-MRI** *Raymond Mushabe, Bergit Brattekås, Na Liu, Geir Ersland, Nicole Dopffel*

THURSDAY, 25 MAY 2023

Coffee Break & Exhibition

Cromdale Hall 15:30 - 17:00

Coffee, beer & soft drinks are available in the poster and exhibition hall. Come grab a snack, network with other attendees, visit the exhibition booths and discuss the posters on display.

Poster Session VI

Cromdale Hall 15:30 - 17:00

Poster board	
43	[409] **Pore-scale investigation into dynamics of salt crystal nucleation, precipitation and growth in porous media during CO2 sequestration in saline aquifers** *Mohammad Nooraiepour, Mohammad Masoudi, Helge Hellevang*
44	[466] **Experimental Investigation of CO2, Lean and Flue Gas Injection in a Tight Danish North Sea Oil Reservoir** *Rasoul Mokhtari, Ali Talaei, Karen Feilberg*
45	[786] **A numerical study on decreasing CO2 emission by flue gas injection into heavy oil reservoirs** *Yashar Tavakkoli Osgouei, Mehmet Onur Doğan, Caglar Sinayuc*
46	[857] **Comparative study of hydrogen and CO2 performance in subsurface using sharp-interface modelling** *Ehsan Vahabzadeh Asbaghi, Vahid Niasar*
47	[882] **Effect of CO2 injection on porosity and texture of reservoir chalk assessed by 1H low-field gradient NMR measurements** *Leonardo Teixeira Pinto Meireles, Tobias Orlander, Hanne Dahl Holmslykke, Frederik Peter Ditlevsen*
48	[906] **Reservoir-scale simulation of CO2 solutal convection: approaches and limitations** *Igor Bogdanov , Christophe Blondeau*
49	[909] **Design of Colloidal Gas Aphron Drilling Fluid Formulations for Enhanced Deep Geothermal Energy Recovery Operations** *Igor Paevskiy, Ian Collins, Edo Boek*

Poster Session VI, cont.

Cromdale Hall 15:30 - 17:00

Poster board	
50	[935] **Hydrochemically detrimental factors in ATES applications – An analysis of clogging and scaling processes based on column and batch experiments** *Leonie Gabler, Alireza Arab, Martin Binder, Christian Engelmann, Traugott Scheytt*
51	[1062] **CO2 Fluid Properties Parametrization for Accurate Heat, Solubility and Transport Model** *Bora Yalcin, Chima Justin Ezekiel, P. Martin Mai*
52	[102] **All stirred up: Elastic flow instabilities in structurally-heterogeneous porous media** *Sujit Datta*
53	[130] **Flow of Liquid Through a Stagnant Foam in a Model Fracture** *Ewald Jacques Maximiliaan Obbens, Kai Li, William Rossen*
54	[772] **Experimental studies of slow drainage in porous media: Effect of the randomness of the porous medium on the fluid flow** *Khobaib Khobaib, Marcel Moura, Knut Jorgen Maloy*
55	[787] **Nuclear magnetic resonance of drainage and imbibition: Correlating structure and dynamics** *Quirine Krol, Matt Skuntz, Isaak Thornton, James Wilking, Evan*
56	[818] **Morphologically-stable two-phase displacements through localized constrictions are strongly dependent on flow rate** *Jordi Ortín, Ido Lavi, Lauren Rose, Ramon Planet, Jaume Casademunt,*
57	[1016] **Nanoscale interface dynamics: Self-assembly and stability of interface film of multi-phase flow in porous media** *Yuequn Fu*

THURSDAY, 25 MAY 2023

Poster Session VI, cont.

Cromdale Hall 15:30 - 17:00

Poster board	
58	[1094] **Numerical Modeling of Two-Phase Flow in the Porous Pavement Drainage Structure** *Barbara Johansson, Rainer Helmig, Wolfram Ressel*
59	[501] **Investigating interfacial instability snap-off in a uniform capillary with a sharp wettability contrast** *Yemna Qaiser, Harris Rabbani, Thomas Seers, Talha Khan*
60	[776] **Combining Molecular Dynamics and Machine Learning to determine CO2 adsorption features on amorphous nanosurfaces** *Ivan Lunati, Mattia Turchi, Mattia Turchi*
61	[913] **Atomistic computer simulation of the structure and properties of iodine and chlorine containing hydrocalumite (AFm phase) as adsorbent for radionuclides 36Cl, 129I, 137Cs** *Artem Glushak, Grigory Smirnov, Evgeny Tararushkin, Andrey Kalinichev*
62	[992] **Investigation on the heat change during the disintegration process of pharmaceutical tablets** *Jongmin Lee, Daniel J. Goodwin, Ranjit M. Dhenge, Joelle Nassar, Axel Zeitler*
63	[808] **How does electrical field affects and enhances contaminant migration in porous media ?** *Noura Eddaoui, Cyprien Soulaine*
64	[908] **A Size-Structured Approach for Filtration Modelling** *Connor McAllister, Ian Griffiths, Chris Breward*
65	[815] **Direct Numerical Simulation of weak-inertia single-phase flow in porous materials using SPH** *David Krach, Holger Steeb*
66	[923] **The effects of sand bridge structures on gas and water relative permeability evolution during the continuous sand migration process in hydrate-bearing porous media** *Shanshan Zhou, Kunpeng Xue, Tian Xue, Guanbin Liu, Yu Liu, Vahid Niasar*

Poster Session VI, cont.

Cromdale Hall 15:30 - 17:00

Poster board	
67	[978] **Multiscale Direct Numerical Simulation of Pore Scale Fluid Flow Through Porous Media** *Gospel Ezekiel Stewart, Julien Maes, Hannah Menke*
68	[1012] **Mono-energetic Micro-computed tomography(μCT) A reliable potential alternative to mineral Investigation of formation rock**
69	[1092] **Anisotropic stochastic Pore Network generation algorithm with application to shale gas flow** *Georgy Borisochev, Andreas Busch, Jingsheng Ma, Lin Ma*
70	[748] **Innovating porous materials characterization for hydrogen-storage applications** *Mohammad Hossein Khoeini, David Smeulders, Maja Ruecker, Azahara*
71	[931] **Expanding Digital Rocks Portal with benchmark datasets and engineered porous media** *Masa Prodanovic, Maria Esteva, James McClure, Bernard Chang,*
72	[485] **Stress concentration in the local load sharing fiber bundle model** *Elias Lundheim, Alex Hansen, Jonas Tøgersen Kjellstadli, Santanu Sinha*
73	[867] **Mediation of water vapour transport in nanopores via salt solutions: thermodynamic and kinetic study** *Sujeet Dutta, HUGO BELLEZZA, joachim trosseille, Alexandre Littiere,*
74	[886] **Water imbibition in nanoporous Vycor glass: X-ray tomography-based Lattice-Boltzmann simulations and their validation by optical and gravimetric experiments.** *Juan Sanchez, Mariia Liseanskaia, Sahar Bakhshian, Juliana Martins de Souza e silva, Laura Gallardo, Yannick Tetzner*

THURSDAY, 25 MAY 2023

Poster Session VI, cont.

Cromdale Hall 15:30 - 17:00

Poster board	
75	[891] **Structural and transport properties of hydrocarbons in clay nanopores** *Vasily Pisarev, Andrey Kalinichev, Mikhail Logunov*
76	[1041] **Deliquescence of salt nanocrystals** *Tanya Talreja-Muthreja, Michael Steiger*
77	[1075] **Effect of fluids on micro-crack evolution in organic-rich shale by molecular dynamics simulations and nanomechanical experiments: A microscopic perspective from the fluid effect on fracturing** *Tianhao Wu, Junliang Zhao, Abbas Firoozabadi, Dongxiao Zhang*
78	[481] **Modelling surface-washing of porous media: dye-attenuation of a passive tracer** *Francesco Paolo Conto', Emily Butler, Merlin Etzold, Julien Landel, Stuart Dalziel*
79	[658] **Compositional and Structural characterization of complex fluids via Electrical Impedance Spectroscopy and Electron Microscopy** *Nicolae Tomozeiu, Hélder Marques Salvador, Hamid Mansouri*
80	[969] **Advanced mesoporous thin film characterisation by ellipsometric porosimetry** *Mate Furedi, Bálint Fodor, András Marton, Alberto Alvarez-Fernandez, Péter Basa, Stefan Guldin*
81	[252] **Entropy generation analysis in a quasi-3D PEM fuel cell model with architectured electrocatalyst layer** *Mehrzad Alizadeh, Patcharawat Charoen-amornkitt, Takahiro Suzuki, Shohji Tsushima*

Plenary Lecture

Pentland Auditorium 17:00 - 17:40
Chair: *Tadeusz W. Patzek* (KAUST)

J. Carlos Santamarina
Georgia Institute of Technology, *USA*

Multi-Physics Repetitive Loads

Most natural and engineered systems experience repetitive loading cycles of all kinds, including: stress (our bones and foundations), fluid pressure (the beating of our hearts, tidal action, and pumped hydro storage), suction (our lungs and natural dry-wet cycles), pore fluid chemistry (salt-water intrusion), and thermal cycles (such as silos, freeze-thaw, and geothermal systems). Repetitive loads can cause significant accumulations of volumetric strain (towards the terminal void ratio) and plastic shear strains (shakedown or ratcheting), lead to accelerated transport (of heat, chemical species and particles), and alter material properties and system performance. Complementary multi-scale experiments and simulations provide unique insights into the underlying mechanisms that explain the observed responses. Analysis and design must consider the influence of multi-physics repetitive loads on the long-term performance, serviceability and safety of engineered systems. Asymptotic trends can be used to obtain first-order estimates for simple boundary conditions; however, complex boundary conditions require numerical simulations, the development of new constitutive models and the implementation of hybrid algorithms that avoid standard time-stepping numerical protocols.

Plenary Session
Pentland Auditorium *17:40 - 18:05*
Chair: *S. Majid Hassanizadeh*

Award Ceremony 4 *17:40 - 18:00*

MDPI Energies Student Poster Awards

The MDPI Energies Student Poster Award is given in recognition of outstanding student poster presentations at the annual InterPore conference. Each year, at the annual InterPore conference, the Honors and Awards Committee will choose the best student poster presentations to win the MDPI Energies Student Poster Award.

A word of gratitude: This award has been made possible by a generous grant from MDPI Energies.

InterPore PoreLab Award for Young Researchers
Pranay Shrestha
University of Toronto, Canada

This award is given to a young researcher in recognition of outstanding contributions in the field of porous media from a fundamental point of view. The research may be theoretical, computational, or experimental.

A word of gratitude: This award has been made possible by a generous grant from PoreLab (a research center of excellence jointly formed by Norwegian University of Science and Technology (NTNU)) in Trondheim and the University of Oslo (UiO). PoreLab focuses on the physics of porous media using experimental, theoretical and computational methods.

Award Ceremony 4, cont.

Pentland Auditorium 17:40 - 18:00

Rien van Genuchten Early-Career Award of Porous Media for a Green World

Junjie Zhong

China University of Petroleum, China

The Rien van Genuchten Early Career Award is given to an early-career researcher whose focus is the general topic of "porous media research for a green world". This may involve significant theoretical, experimental and/or modeling advances addressing major soil, hydrologic and/or environmental problems facing our planet.

A word of gratitude: This award has been made possible by a generous donation from Dr. Betty-May Pontedeiro to the InterPore Foundation and is created in honor of the eminent soil and groundwater scientist Marthinus (Rien) Th. van Genuchten. Rien van Genuchten is world renown for his enormous achievements in the area of fluids flow and solutes transport in partially-saturated porous media. He has made highly impactful contributions to the understanding and modeling of subsurface processes, in such widely varying fields as soil physics, hydrology, geology, the environmental sciences, and civil engineering.

InterPore National Chapter Awards

Benelux InterPore Chapter

Norway InterPore Chapter

The National Chapter Awards are given in recognition of remarkable activities over the past year.

Award Ceremony 4, cont.
Pentland Auditorium 17:40 - 18:00

InterPore Rosettes

InterPore activities are carried out mainly by volunteers. It takes many voluntary working hours to make an international platform like InterPore a success. Recognizing and honoring volunteers sets a standard for service, encourages a sustained commitment to participation, and inspires others to commit themselves as well.

Each year, InterPore honors selected individuals who have made very significant contributions to InterPore activities; they receive the InterPore Rosette.

Recipients:
Andreas Busch
Kamaljit Singh
Afshin Goharzadeh
Serveh Kamrava
Martin Blunt
Mike Celia
Ezequiel Medici
Alejandro Otero

Closing Ceremony
Pentland Auditorium 18:00 - 18:05

A brief video of Qingdao, China, the InterPore2024 location, will be shown.

ONLINE PRESENTATIONS

All digital content can be viewed from the "Online" section of Whova

[10] **APPLICATION OF SUPER-RESOLUTION CONVOLUTIONAL NEURAL NETWORK TO IMPROVE THE RESOLUTION OF DIGITAL ROCK MICRO-CT IMAGES**
Ramin Soltanmohammadi, Shohreh Iraji, Joao Paulo da Ponte Souza, Mateus Basso, Alexandre Campane Vidal

[25] **Application of CO2 huff-n-puff Enhanced Recovery and Geological Storage Technology in Santang Lake Oilfield**
Yangyue Xiang

[48] **Label-Free AI-Based Surrogate Modelling for Highly Compressible Subsurface Flow**
Victor Molokwu, Mahmoud Jamiolahmady

[53] **Young-Laplace equation in shale and nanopores**
Mehdi Alipour, Ahmad Sakhaee-Pour

[57] **The influence mechanism of gas pressure on multi-scale dynamic apparent diffusion-permeability of coalbed methane**
zhiqiang Li, Lin Li

[68] **Experimental study on methane hydrate formation and decomposition characteristics in a micromodel**
Jianbo Zhang, Jihao Pei, Xiaohui Sun, Bangtang Yin, Baojiang Sun, Zhiyuan Wang

[72] **Pore network extraction from multiscale images: an efficient approach based on artificial neural network**
Abolfazl Moslemipour, Saeid Sadeghnejad, Javad Razavi Nezhad, Davood Khoozan, Frieder Enzmann, Michael Kersten

[73] **Image resampling: a vital prerequisite step in multi-scale modelling of heterogeneous rock samples**
Abolfazl Moslemipour, Saeid Sadeghnejad, Javad Razavi Nezhad, Davood Khoozan, Frieder Enzmann, Michael Kersten

ONLINE PRESENTATIONS

All digital content can be viewed from the "Online" section of Whova

[74] **Quantitative evaluation of microscopic distribution morphology and saturation calculation of natural gas hydrate**
Huaimin Dong, Jianmeng Sun

[75] **Pore-Scale Modelling on Hydrogen Transport in Porous Media: Implications for Hydrogen Storage in Saline Aquifers**
Jinlei Wang, Yongfei Yang

[86] **A Productivity Analysis Method Of Low Permeability Reservoir In Beibuwan Basin**
Lei Wang, Wenjuan Wang, Qiaoliang Zhang, Guangqing Yao, Shaofei Yue

[88] **Simulation Research on the Profile Control Mechanism of Foam Fluid in Fractured Reservoirs**
Zhihao Yu, Fei Wang, Juan Chen

[91] **Impact of wettability alteration on salt transport and mixing during low-salinity waterflooding**
Arman Darvish Sarvestani, Behzad Rostami, Hassan Mahani

[99] **A Novel CO2 Geological Sequestration Technology: Geothermal Assisted CO2 Catalytic Reduction**
Rukuan CHAI

[104] **Permeability Up-scaling of Digital Rocks via Physics-Informed Neural Networks**
Mohamed Elmorsy, Wael El-Dakhakhni, Benzhong Zhao

[113] **Pore-scale study of solid phase emergence and mass transfer processes during DNAPL remediation**
Zejun Wang, Zhibing Yang, Ran Hu, Yi-Feng Chen

[115] **Impact of the stiffness contrast on the rupture of injection-induced earthquakes**
David Santillan Sanchez, Juan Diego Valadés, Juan Carlos Mosquera Feijoo, Luis Cueto-Felgueroso

[116] **Efficient Forecasting of Production Statistics Combining Single-phase and Multiphase Flow Models**
Qinzhuo Liao, Gensheng Li, Gang Lei

ONLINE PRESENTATIONS

All digital content can be viewed from the "Online" section of Whova

[119] **Experimental Study of Liquid Cohesion Effect on Particle Clogging in Rock Fractures**
Renjun Zhang, Zhibing Yang, Russ Detwiler, Dongqi Li, Gang Ma, Ran Hu, Yi-Feng Chen

[126] **Investigation of foam evolution in fractured-vuggy reservoirs**
Zhengxiao Xu, Zhaomin Li, Lei Tao, Tong Yu, Zihan Gu

[131] **Pore-scale Investigation of Hydrogen-Water Displacement and Trapping Mechanisms during UHS Process**
Mehdi Bahrami, Hassan Mahani, Shahab Ayatollahi, Davood Zivar

[133] **Pore-scale Simulation of the Effect of Interfacial Viscoelasticity in Low-Salinity Waterflooding**
Ahmadreza Kamani, Shahab Ayatollahi, Hassan Mahani

[135] **Pore-Scale Simulation of the Interdependency of the Corner-Flow, Roughness, and Time-Effect on the Efficiency of Low-Salinity Waterflooding in a Mixed-Wet System**
Ali Ahmadi Falavarjani, Hassan Mahani, Shahab Ayatollahi

[143] **An Integrated Approach to Evaluate Lacustrine Shale Oil Reservoir Combining Advanced Well Logging and Core Analysis**
Liang Cai, Yafeng Li

[154] **SMARTWATER FLOODING: ASSESSMENT OF MOLECULAR STRUCTURES AT OIL/BRINE INTERFACES**
Salem Alshammari, Dongkyu Cha, Mohammed AlOtaibi, Subhash Ayirala, Ali A. Yousef

[162] **Real-time Basin-scale Carbon Dioxide Storage Modeling using Fourier Neural Operators**
Gege Wen, Zongyi Li, Qirui Long, Kamyar Azizzadenesheli, Anima Anandkumar, Sally Benson

[163] **ML-enabled models of ground water transport processes**
Mina Karimi, Kaushik Bhattacharya

[164] **A Multiphase Energy-based Poromechanics Model for CO2 Injection into Deep Saline Structures**
Mina Karimi, Mehrdad Massoudi, Noel Walkington, Matteo Pozzi, Kaushik Dayal

[165] **Developments of single-phase and multiphase micro-continuum approaches: models to applications**
Qianghui Xu, Jun Shen, Zhiying Liu, Junyu Yang, Lin Shi

ONLINE PRESENTATIONS

All digital content can be viewed from the "Online" section of Whova

[170] **Analytical prediction of the relationship between permeability and formation factor accounting for percolation thresholds**
Yannick Nkocko Awountsa, Hardus Diedericks, Francois Smit, Sonia Fidder-Woudberg

[171] **Droplet evaporation at the interface of a coupled free flow – porous medium system: Modelling and analysis**
Maziar Veyskarami, Rainer Helmig, Carina Bringedal

[179] **Investigation on water-oil displacement efficiency in heterogeneous porous media based on Voronoi tessellations**
Ziwei Liu, Yongfei Yang, Jun Yao

[200] **Automated Symbolic Upscaling: Model Generation for Extended Applicability Regimes**
Kyle Pietrzyk, Ilenia Battiato

[203] **Impacts of microbial biodegradation and biodiversity on petroleum engineering environment**
Turan Mutallimov

[207] **Finite element simulation of four - dimensional geostress field under pressure flooding with different fracture network modes**
mingwei jia, Yongmao Hao

[218] **Micro simulation of CO2 flow-induced fracture propagation in deep shale**
Ziwei Liu, Yongfei Yang, Jun Yao

[230] **Numerical Simulation of Fluid-structure Interaction Mechanism of Fractured Porous Media with Natural Fracture**
Shiying Shi, Yuliang Su

[231] **Adsorption behaviors of shale oil and water in mixed-wet pores by molecular simulation**
huaisen song, Yongfei Yang, Jun Yao

[232] **Semi-analytical Solution of Multi-scale Transient Flow to a Horizontal Well Considering Micro-scale Lamellation in Shale Oil Reservoirs**
qian zhang, Wendong Wang, Yuliang Su

[237] **Saturated Mixing due to Reactive Viscous Fingering in Porous Medium**
Priya Verma, Vandita Sharma, Manoranjan Mishra

ONLINE PRESENTATIONS

All digital content can be viewed from the "Online" section of Whova

[238] **On the Influence of Permeability Variation and Viscous Fingering on Dispersion in Miscible Flow Displacements**
Mozhdeh Sajjadi

[240] **A sensitivity analysis on the performance of geothermal heat exchangers implemented in abandoned oil and gas wells**
Mozhdeh Sajjadi, Yasin Ahmadpoor, Mohammad Emami Niri

[246] **In-Silico Screening of CO2 Diffusion and Ions Distribution in Porous Media**
Ali Mirzaalian Dastjerdi, Riyaz Kharrat, Vahid Niasar, Holger Ott

[249] **Propagation law of high pressure water injection in low permeability reservoir**
mingwei jia, Yongmao Hao

[256] **A comprehensive evaluating of acid-rock interaction induced shale pore structure change by fractal parameters**
Sai Xu, Yuxuan Xia, Lei Wang, Jianchao Cai

[268] **Utilizing Multi-scale Computed Tomography to Understand Pore Structures of Carbonate Rich Samples for Geologic Carbon Sequestration in the Southeastern, US.**
Otis Williams, Lauren Beckingham

[270] **Superposition of colloid-surface repulsion and incomplete pore scale mixing explains emergence of fast-and slow-attaching subpopulations from identical individuals, and depletion of fast-attachers with increasing transport distance under unfavorable condi**
William Johnson, Santiago Jurado

[275] **A Pore-Level Multiscale Method for the Elastic Deformation of Fractured Porous Media**
Kangan Li, Yashar Mehmani

[285] **Unveiling Coupled Transport and Reactivity Mechanisms in Shale Caprocks with X-ray Computed Tomography**
Manju Pharkavi Murugesu, Bolivia Vega, Cynthia Ross, Takeshi Kurotori, Jennifer Druhan, Anthony Kovscek

[290] **Effect of elevated pressure and temperature on seepage characteristics of mixed wettability porous media**
Xindi Lv

ONLINE PRESENTATIONS

All digital content can be viewed from the "Online" section of Whova

[295] **Dual-porosity Conductive Model of Tight Sandstone Reservoir**
Xuefeng Liu, Zizeng LI, Weiwei Zhang

[298] **Hydraulic properties of monodisperse granular materials of different grain shape: an insight from pore-network perspective**
Jie Qi, Wenbin Fei, Guillermo A. Narsilio

[299] **Reduced-order Modeling of Crack Nucleation and Growth in Porous Microstructures**
Sabit Mahmood Khan, Yashar Mehmani

[301] **Prediction of particle deposition at the pore scale using convolutional neural networks**
Javad Razavi Nezhad, Abolfazl Moslemipour, Saeid Sadeghnejad, Thorsten Schäfer, Frieder Enzmann, Michael Kersten

[308] **Effect of Dihydrogen Phosphate Anion in Smart Waterflooding through Zeta Potential Measurements and Coreflooding Simulations**
Samuel Fontalvo, Salem Alshammari, Moataz Abu-Al-Saud, Subhash Ayirala

[314] **An efficient and robust fully implicit pore-network model for the pore-scale simulation**
Hanchuan WU, Johannes Müller, Martin Schneider, Maziar Veyskarami, Bernhard Weigand, Rainer Helmig

[328] **An experimental study on fracturing of concrete by using SCCD specimens and its potential application in renewable resource energy industry**
xiaoqing Lyu

[333] **Damage resistance of porous asphalt mixture with additives subjected to freeze-thaw cycles and salt erosion**
Weidong Ji, huining Xu, He Zhan

[338] **Pore-scale simulation of acidic dissolution in porous media with sub-resolution porosity using the improved multiphase micro-continuum approach**
Zhiying Liu, Qianghui Xu, Junyu Yang, Lin Shi

[346] **Adsorption and Oversolubility in Hierarchical Nanoporous Zeolites**
Vishnu Prasad Kurupath, Benoit Coasne

[357] **Numerical modeling of seismic monitoring of spatial saturation distribution in loosely deposited sands**
Tengfei Deng, Olaf Hellwig, Felix Hlousek, Dominik Kern, Stefan Buske, Thomas Nagel

ONLINE PRESENTATIONS

All digital content can be viewed from the "Online" section of Whova

[367] **Extraction of pore structure information in nanoporous media with sub-resolution porosity using X-ray nanotomography**
Xuanqing Lou, Zuleima Karpyn

[381] **Experimental study on microscopic mechanism of shale oil development by supercritical CO2/H2O huff -n- puff**
Xiaomei Zhou, Lei Li

[391] **Implementation of a hybrid encoder-decoder structure to segment 2D micro-CT images of Sandstones**
Amir Hossein Rajabi-Ghozloo, Mohammad Emami Niri

[399] **Coupled Geochemical-geomechanical Processes in CO2 Sequestration Reservoirs in Southeast, US**
Zhuofan Shi, Jack Montgomery, Charlotte Garing, Lauren Beckingham

[407] **Microwave-assisted synthesis of calcium oxide microstructures for carbon dioxide capture at high temperature and moderately high pressure**
Paola Arjona-Jaime, Rene Rangel-Mendez

[419] **Simulation of the two phase displacement characteristics in porous media based on the digital core technology**
Dong Wang, Jiaqi Liu, Yingge Li, Dongxing Du

[450] **Analysis of Effects of Minerals and Pores on Elastic and Electrical Properties Based on Multimineral and Multiscale Digital Rocks**
Yuqi Wu, Keyu Liu, Chengyan Lin

[473] **From Infrared Light to Geomechanical Properties of Shales**
Lee Jungin, Olivia Cook, Andrea Aguelles, Yashar Mehmani

[478] **Kidney Stones Characterization Using Digital Core Analysis**
Sergey Tkachev, Artur Shapoval, Gevorg Galechian, Danila Golub, Alim Dymov, Stanislav Ali, Lee Yuliya, Pavel Chislov, Stanislav Evlashin, Julia Bondareva, Anastasia Karpenko, Boris Ershov, Elena Popova, Anastasiya Akovantseva, Stuart Clark, Denis Butnaru, Andrey Vinarov, Peter Timashev

[493] **Experimental Investigation of Oil Recovery Mechanisms Using Water -wet and Mixed-wet microfluidic devices**
Abdullah AlOmier, Antonia Sugar, Dongkyu Cha, Subhash Ayirala, Mohammed AlOtaibi, Ali A. Yousef, Hussein Hoteit

ONLINE PRESENTATIONS

All digital content can be viewed from the "Online" section of Whova

[496] **Magnetic Resonance Imaging for the Characterization of Local Particle Wetting inside a Slender Trickle Bed Reactor**
Ali Fathiganjehlou, E.A.J.F. (Frank) Peters, K.A. (Kay) Buist, J.A.M. (Hans) Kuipers

[506] **Solute and Particle Transport into thin Porous Media: from Microfluid Perspective**
Qianjing Tang

[512] **The influence of pore-body-to-pore-throat aspect ratio on emulsification**
Ahmad Kharrat, Judy Jalkh, Holger Ott

[549] **Fingering Instabilities in a Radial Hele-Shaw Cell with Wettability Heterogeneities**
Zhonghao Sun, Carlos Torres-Verdín

[576] **Assessment of the reversible degradation pathway of Diclofenac in soil-water systems**
Laura Ceresa, Alberto Guadagnini, Giovanni Porta, Monica Riva

[581] **Hydrogen storage in a water-filled 2.5D micromodel**
S.ali ghoreishi, Hossein Hejazi

[583] **Droplet dynamics at the interface between gas diffusion layer and gas distributor channel in polymer electrolyte membrane fuel cells**
Maziar Veyskarami, Rainer Helmig, Carina Bringedal

[584] **Rapid modeling of deep learning surrogate based models for CO2 utilization and sequestration**
Jianchun Xu, qirun Fu

[587] **A New Hybrid Pore-Scale Simulation Method to Characterize Nanoparticles Transport and Attachment Behaviors in a Microchannel**
Yue Li, Yuan Bin, Can Ke

[589] **Accurate and fast rock image segmentation using U-net with a Mobile-net backbone**
Marzieh Ghadimi Mahanipour, Mohammad Emami Niri

[591] **Relaxation modeling for convection-diffusion problems**
Arthur Espírito Santo, Eduardo Abreu, Wanderson Lambert, John Pérez

[596] **Estimation of mineral accessible surface area from mineral abundance and clay content**
Md Fahim Salek, Fanqi Qin, Parisa Asadi, Chidera Iloejesi, Olivia Brunhoeber, Muksit Mahmood, Lauren Beckingham

ONLINE PRESENTATIONS

All digital content can be viewed from the "Online" section of Whova

[598] **Lattice Boltzmann Simulation on Reactive Transport of Calcite Dissolution by Injecting CO2-saturated Brine during Sequestration**
Qiuheng Xie, Wendong Wang, Yuliang Su, Sina Rezaei-Gomari, Han Wang, Zhouyuan Zhang, Wubin Yan

[602] **Evaluation of gypsum-rich rock formations in the context of geological carbon sequestration**
Jamie Newsome, Lauren Beckingham

[604] **Fabrication of Synthetic Porous Media with Altered Petrophysical Properties**
Sahchit Chundur, Shaina Kelly

[605] **Relating Thermophysical and Petrophysical Properties in Geologic Porous Media**
Sahchit Chundur, Shaina Kelly

[612] **Free energy of water confined in porous media.**
Chao Zhang, Lingyun Gou, Shaojie Hu, Ning Lu

[614] **The Role of Iodide Ions in Wettability Alteration in Carbonates**
Ahmed Gmira, Dongkyu Cha, Hussain Saleem

[615] **Effect of ionic composition on carbonate and dolomite interfaces: a Direct Imaging at nanoscale by Cryo-BIB-SEM**
Ahmed Gmira, Dongkyu Cha, Hussain Saleem

[616] **A novel deep-learning based super-resolution method for improving the accuracy of petrophysical property prediction from Digital Rock Physics workflows**
Vishal Ahuja, Utkarsh Gupta, Shivani R. Rapole, Nishank Saxena, Ronny Hofmann, Ruarri J. Day-Stirrat

[618] **Morphology and hydrodynamic properties of hydrates during dissociation in sediment**
Zhixue Sun, Yifan Yin, Yuqi Wu, Zhilei Sun, Yuting Zhan, Vahid Niasar, Senyou An

[622] **A poroelasticity theory for soil incorporating adsorption and capillarity**
Chao Zhang, Shaojie Hu, Zemin Qiu, Ning Lu

ONLINE PRESENTATIONS

All digital content can be viewed from the "Online" section of Whova

[638] **Understanding the influence of biomineralization kinetics on pore morphology by evaluating geometric characteristics: Internal specific surface area, tortuosity, and pore-size distribution**
Daehyun Kim, Hojeong Kang, Jiwon Choi, Tae Sup Yun, Toshiro Hata

[650] **Modeling the effects of pore-scale geochemistry on the performance of polymer and low salinity water flooding in carbonate reservoirs**
Angelo Kennedy Lino Limaluka, Yogarajah Elakneswaran

[656] **Nanostructure and Interfacial Mechanical Properties of PEG/ Cellulose Nanocomposites Studied with Molecular Dynamics**
Wenqiang Liu, Ali Shomali, Chi Zhang, Benoit Coasne, Jan Carmeliet, Dominique Derome

[660] **Numerical Investigation of Multiple Influential Factors in Hydraulic Fracturing Processes Using Coupled Discrete Element-Lattice Boltzmann Method**
Weiwei Zhu, Zhiqiang Chen, Moran Wang

[667] **Nanoparticle migration in a porous medium and a polymeric inelastic non-Newtonian fluid**
Masoud Babaei, Takshak Shende, Vahid Niasar

[671] **Nanoconfined water and aqueous solutions investigated by molecular simulations and NMR**
Simon Gravelle, Alexander Schlaicht, Christian Holm

[679] **Predicting Velocity Field of Porous Rocks using Convolutional Neural Networks**
Saeed Shidvash, Mehrdad Vasheghani Farahani, Mohaddeseh Mousavi Nezhad, Saeid Sadeghnejad

[685] **Pore-scale modeling of PFAS transport in water-unsaturated soils influenced by nonequilibrium mass-transfer processes in thin water films**
Sidian Chen, Bo Guo

[698] **Numerical study of hydrodynamic interactions in coupled free-flow and porous media in laminar flow regime**
Chakradhar Kakumani, Subhasisa Rath, Alexandros Terzis

[712] **Analysis of the potential of CO2 Sequestration in the Washita-Fredericksburg Formation**
Nora Lopez Rivera, Lauren Beckingham

ONLINE PRESENTATIONS

All digital content can be viewed from the "Online" section of Whova

[716] **Experimental and triple-layer surface complexation modelling study: influence of temperature on interface properties in crude oil-brine system**
Yogarajah Elakneswaran, Xingjuan Hao, Dong Kyu Cha, Moataz Abu-Al-Saud, Ayirala Subhash

[718] **Multicomponent bubble ripening in porous media: the case of hydrogen storage**
Nicolas Bueno, Luis Ayala, Yashar Mehmani

[719] **Effect of chemical fluid-solid interaction on physical properties of rocks: a 3D numerical study**
Vadim Lisitsa, Tatiana Khachkova, Yaroslav Bazaikin, Dmitry Prokhorov

[722] **Understanding the impact of small-scale topographies on multicomponent reactive transport processes within the groundwater and surface water mixing zone using a fully-coupled modeling framework**
Pei Li, Mohamad Reza Soltanian

[724] **Study on the effect of aqueous phase on CO2 huff-n-puff in tight oil reservoirs and the corresponding stimulation measures.**
Junrong Liu, Hangyu Liu, Shuyang Liu, Jianchun Xu, Xiaopu Wang

[725] **Influence of Inertial and Centrifugal Forces on Flow Rate and Patterns of Flow in Natural Fracture Networks**
Stephan Matthai, Heraji Hansika, Cuong Bui, Samintha Perera

[726] **Predicting interfacial tension and adsorption at air-water and NAPL-water interfaces for multicomponent PFAS and hydrocarbon surfactants**
Bo Guo, Hassan Saleem, Mark Brusseau

[728] **Pore network modeling of evaporation in porous media with continuous and discontinuous corner films: corner-network and hybrid pore-network**
Ninghua Zhan, Rui Wu, Abdolreza Kharaghani, Evangelos Tsotsas

[739] **Unsaturated hydro-mechanical modeling of desiccation cracks in Opalinus Clay**
Tuanny Cajuhi, Gesa Ziefle, Jobst Massmann, Keita Yoshioka

[761] **Micro-Scale Characterization of Nanoparticles Adsorption onto Oil-Water Interface and Stripping Capacity of Oil Film: Effect of "Ship Anchor "**

ONLINE PRESENTATIONS

All digital content can be viewed from the "Online" section of Whova

[778] **Machine learning augmented permeability prediction from X-ray micro-computed tomography reservoir rock images**
Indrajeet Kumar, Bineet Kumar Tripathi, Anugrah Singh

[780] **Exploring the Potential of Pre-trained Backbones for Analyzing Raster Electron Microscopy Images of Opalinus Clay**
Marco Brysch, Monika Sester

[781] **A New Model of Shift Factor for Sphere Pack Samples by 3D Microscale Flow Simulation of Shear Thinning Fluids**
Mehdi Amiri, Jafar Qajar, Ali Qaseminejad Raeini, Amir Raoof

[801] **Calculation method and numerical simulation of fluid phase behavior migration in nano-confined space of shale oil reservoir**
Jinchong Zhou, Renyi Cao, Zhihao Jia, Linsong Cheng, Hongxin Guo, Yongchao Xue, Pin Jia

[810] **The application of focused ion beam scanning electron microscope (FIB-SEM) to the nanometer-sized pores in shales**
Yunfei Zhang, Zhaojie Song, Lichao Zhang, Yufan Meng

[813] **The influence of depletion rate on the thermodynamics of retrograde gas condensates**
Desmond Dorhjie, Timur Aminev, Alexey Cheremisin

[830] **Wettability of Supercritical Carbon Dioxide, Brine, and Shale as a Function of Pressure**
Deepak Tapriyal, Foad Haeri, Dustin Crandall, Angela Goodman

[845] **Predicting the effect of capillary heterogeneity on methane plume migration in shallow unconfined aquifers: Physics-based and surrogate modeling**
Reza Soltanian, Reza Ershadnia, Moeini Farzad

[853] **GROWTH OF BIOFILM AT PORE SCALE IN LAMINAR FLOW**
Araceli Martín

[865] **Enhancement of the longitudinal modulus of liquid adsorbates in nanoporous Vycor glass**
Klaus Schappert, Rolf Pelster

[874] **Unravelling Dynamic Wetting Behaviour Inside Sponges for Oil/ Water Separation**
Pavani Cherukupally, Gijs Wensink, Veerle Cnudde, Laurenz Schröer, Maja Ruecker

ONLINE PRESENTATIONS

All digital content can be viewed from the "Online" section of Whova

[890] **Rarefied gas flow through the thin porous dust layer on the surface of comets**
Omar Mokhtari, Nicolas Thomas

[892] **Experimental investigation of the impacts of net stress on pore confinement effects on the effective dew point pressure of gas condensate mixtures**
Hosein Doryani, Mahmoud Jamiolahmady

[893] **Evolution of water films on mineral surfaces in partially-saturated porous media**
Abdullah Cihan

[895] **Prediction and Real-Time Optimization in Biogas Production Plants with Circulating Flow**
Babett Lemke, Arne Naegel, Falko Niebling, Michael Tietze, Gabriel Wittum, Rebecca Wittum

[902] **Thermo-mechanical model of second-graded porous materials: A higher-order homogenization approach**
Bozo Vazic, Pania Newell

[904] **A Neural Network Model to Predict Nonlinear Dynamics and Deterministic-Chaotic Gas Migration in Bentonite**
Boris Faybishenko, Yifeng Wang, Jon Harrington, Elena Tamayo-Mas, Jens Birkholzer, Carlos Jové-Colón

[918] **Coreflood Study of Combined Low-Salinity Water and Chemical Process for EOR at Field Conditions in a Reservoir Core**
Teresa Guadalupe Roldán Carrillo, Rodrigo Orlando Salazar Castillo, Gladys Teresa Castorena Cortés, Patricia Olguín Lora

[926] **Porous Media as Active Matter for Future Energy Supply and Climate Remediation**
Klaus Regenauer-Lieb, ManMan Hu

[927] **Typical elements recognizing and morphological characteristics assessing of air voids in asphalt mixture**
huining Xu, Hao Shi

[929] **A thermal-poro-elasto-plastic coupled model of hydraulic fracturing in deep reservoirs**
Wenzheng Liu, Wenzhong Li, Yuanpeng Jiang, Yu Wang, Jianting Huang

ONLINE PRESENTATIONS

All digital content can be viewed from the "Online" section of Whova

[930] **Nonlocality stemming from dynamic interaction between the skeleton, the pore, and the environment**
ManMan Hu, Klaus Regenauer-Lieb

[934] **Optimizing the sweep efficiency of injection fluid in a waterflooding process with Reinforcement Learning**
Bineet Kumar Tripathi, Indrajeet Kumar, Anugrah Singh

[936] **Modeling and simulation of chemical reactions in porous media**
Oleg Iliev, Sebastian Osterroth, Pavel Toktaliev

[940] **Experimental Study of Gas Flow in a Nanoporous UK-Based Shale Core Sample**
Hosein Doryani, Mahmoud Jamiolahmady, Jingsheng Ma, Jim Buckman

[942] **A Systematic CO2 Huff-n-Puff Injection Approach for Enhanced Condensate recovery and CO2 storage.**
Ifeanyi Seteyeobot, Mahmoud Jamiolahmady

[947] **Bulk and leading-edge dynamics in glioblastoma invasion**
Dumitru Trucu

[948] **Porous design of the nasal ducts of Arctic animals for efficient air heating and moistening: An entropy generation approach**
Natalya Kizilova, Signe Kjelstrup, Hyejeong Cheon, Øivind Wilhelmsen, eirik flekkøy

[961] **Spatial permeability evaluation in carbonate rocks using spin echo magnetic resonance imaging at 0.6 T**
Adam Fheed, Artur Krzyżak

[963] **Corner flow Impact in forced imbibition by color lattice Boltzmann model**
Jianchao Cai, Yang Liu, Steffen Berg, Yang Ju

[967] **Electrolyte Wetting in the Production of Lithium-Ion Batteries: A Simulation Approach on Multiple Scales**
Stefan Rief, Konrad Steiner, Dariusz Niedziela, Jochen Zausch, Stephan Hoecker

[973] **Evolution of porous rock permeability under cyclic confining pressure**
Evgenii Kozhevnikov, Mikhail Turbakov, Evgenii Riabokon, Evgenii Gladkikh, Vladimir Poplygin, Mikhail Kriukovskii

ONLINE PRESENTATIONS

All digital content can be viewed from the "Online" section of Whova

[1001] **Permeability damage and restoration in porous media due to clay migration during fresh water injection**
Pramod Bhuvankar, Abdullah Cihan, Jens Birkholzer

[1002] **Method and Application for Judging Critical Temperature of Heavy Oil Rheology**
Jinto Wu, Guangming Pan, Hao Li, Jifeng Qu, Yang Lijie

[1003] **Research and Practice of Enhanced Production Control in Offshore Ultra-High Water Cut Oilfield**
Jinto Wu, Bingchang Qu, Bin Liu, Guangming Pan, Hao Li

[1005] **Pore-scale characterization and modeling of heterogeneous shale samples based on deep learning**
Yuqi Wu, Keyu Liu, Chengyan Lin, Chunmei Dong

[1010] **Characterization method of wettability of tight sandstone of digital core based on CT scanning**
Jing Yu, Zhongnan Wang, Keyu Liu

[1011] **A Comparison of the Flow of Foam, Gel and Foam-Gel in Carbonate Cores**
Jinxun Wang, Lyla Almaskeen, Abdulkareem AlSofi, Ming Han

[1014] **Partial Molar Properties from Single Molecular Dynamics Simulations**
Thijs. Vlugt

[1018] **Modeling non-equilibrium thermodynamics of cell membranes with lattice Boltzmann methods**
James McClure

[1019] **Key points to be paid attention to in unconventional oil and gas porous flow experiment**
zhengming yang, Xinli Zhao, Yutian Luo, Haibo Li, yapu zhang

[1029] **Physico-chemical variations of shale with artificial maturation**
kouqi Liu

[1033] **Classification, characteristics of shale reservoir and its significance based on the relationship between pore and surface: An example from the Paleogene shale, Jiyang Depression, Bohai Bay Basin, east China**
Liu Shunyu, Cai Jingong

ONLINE PRESENTATIONS

All digital content can be viewed from the "Online" section of Whova

[1038] **Modelling contaminant migration from wastewater drain to subsurface media**
Ashok Keshari, Parag Agrawal

[1039] **Carbon Resilience Calibration Workflow for Production Decarbonization: A Carbonate Case**
Seyedeh Hosna Talebian, Ilia Heidari, Danial esazadeh

[1042] **Modelling Cellular Blood Flow in the Porous Intervillous Space of the Human Placenta**
Qi Zhou, Eleanor Doman, Igor Chernyavsky, Oliver Jensen, Miguel O. Bernabeu, Timm Krüger

[1048] **Understanding the impacts of heat losses on applied smouldering systems**
Tarek Rashwan, Marco Zanoni, Taryn Fournie, Seyed Ziaedin Miry, Jiahao Wang, Gavin Grant, Jose Torero, Jason Gerhard

[1050] **Optimization of porous structures for efficient heating/cooling**
Natalya Kizilova, Signe Kjelstrup

[1058] **Indoor Physical Model Experiment Study on the Influence of Intra-layer and Inter-layer Turbulent Flow on the Sweep Volume**
Xiaofeng Zhou, Fahimeh Hadavimoghaddam, Abdumalik Gayubov, Xiao Zhang, Abdulrahman Ali Almalki, Alexei Rozhenko

[1069] **The potential of sandstones from the Rio Bonito Formation, Paraná Basin, for implementing Carbon Capture and Storage in southeastern Brazil.**
isabella miranda, Lucy Sant'Anna, Colombo Tassinari

[1080] **Characterization of water flow behavior during spontaneous imbibition in coal: From the perspective of fractal theory and NMR tests**
xu yu, Cheng Zhai, Klaus Regenauer-Lieb

[1081] **Poro-Elasto-Plastic Modelling of Hydraulic Fracturing in Natural Fractured Deep Reservoirs**
Wenzhong Li, Wenzheng Liu, Chao Li, Yu Wang, Jianting Huang, Yuanpeng Jiang

[1083] **Digital core on a chip**
Dmitrii Pereponov, Alexander Avdonin, Michael Tarkhov, Vitaly Kazaku, Vladislav Krutko, Alexey Cheremisin, Evgeny Shilov

ONLINE PRESENTATIONS

All digital content can be viewed from the "Online" section of Whova

[1085] **The Anisotropic Wooding Problem**
Islam Shamima, Mohammad Ferdows Ferdows, Rees Andrew, P. Bassom Andrew

[1087] **Splitting schemes for multiscale multicontinuum problems in fractured porous media**
Maria Vasilyeva

[1090] **Early-time dynamics of negatively buoyant plumes in porous media**
Sibasish Panda, Chunendra K Sahu

[1093] **A Layer Discrete Fracture-Matrix Simulation for Production Data Analysis in Well Intercepting Fractures in Multi- layer Tight Gas Reservoirs**
Chengwei Zhang, Shiqing Cheng, Jing Xu, Xuesi Shen, Chong Zhang, Tingting JIANG

[1095] **Experimental study on the wettability of tight conglomerate from Mahu Depression, Junggar Basin, Northwest China**
Jianbang Wu, Yang Shenglai, Li Qiang,

InterPore2024

16th Annual Meeting and Short Courses

13 - 16 May 2024 | Short Courses 12 & 17 May
Shangri-La Hotel, Qingdao, China

The **scientific program** ranges from **pore-scale modeling**, **pore-scale imaging**, to **experimental and numerical methods on larger scales**, to **sensitivity and uncertainty analysis**. Stay abreast of the latest porous media research on trending topics such as **energy transition**, **biotechnics** and **nature-based agriculture**. Presentations will be given on a wide variety of porous media processes in highly diverse applications, including: **oil and gas reservoirs**, **soil and groundwater**, **fuel cells**, **filters**, **foams**, **membranes and more.** InterPore2024 also offers opportunities to find collaborative **industrial and application-oriented institutional partners. Satellite short courses** will be offered before and after the conference.

Topics and Applications

- Mass and heat transport
- Multiphysics-multiphase flow
- Reservoir engineering, CO_2 sequestration, geothermal energy and energy storage
- Colloids and nanoparticle transport
- Soil mechanics and engineering
- Swelling porous media
- Wave propagation
- Biotechnology and biofilms
- Thin and nanoscale porous media
- Fuel cells and batteries
- Food, wood, composites
- Fibers and textiles
- Filters, foams, membranes, papers
- Ceramics and construction materials

Porous Media & Biology

The Focus Theme of InterPore2024 will be "porous media and biology." This includes occurrence and applications of biology in living organs, plants, and in medicine, as well as in soil, oil and gas reservoirs. It will include theories and (bio)physics, experiments, imaging, mathematics, and modelling.

The Perfect Venue

The luxury five-star Shangri-La Hotel is located in Qingdao, a very **cosmopolitan port city** at the **Yellow Sea**. It offers conference center and residence at one location. Known for **Tsingtao** Beer and **international festivals,** Qingdao promotes **friendship, economic & cultural exchanges** between China and others **all over the world**. Come and enjoy one of China's **most liveable cities.**

Program Committee

Chair: Patrick Jenny - *ETH Zürich*
Vice-Chair: Sridhar Ranganathan - *Kimberly Clark*

Local Organizing Committee

School of Petroleum Engineering
China University of Petroleum (East China)

Chair: Prof. Jun Yao
Co-Chairs: Prof. Yongfei Yang, Prof. Kai Zhang, Prof. Hai Sun

www.interpore.org/2024

中国石油大学(华东)
China University of Petroleum